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REDUCING THE COST OF WEAPON SYSTEMS ACQUISITION

HEARING

BEFORE THE

TASK FORCE ON SELECTED DEFENSE PROCUREMENT MATTERS

OF THE

COMMITTEE ON ARMED SERVICES UNITED STATES SENATE

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REDUCING THE COST OF WEAPON SYSTEMS ACQUISITION

TUESDAY, DECEMBER 18, 1984

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
AD HOC TASK FORCE ON SELECTED
DEFENSE PROCUREMENT MATTERS,
Washington, DC.

The task force met, pursuant to notice, at 10:06 a.m., in SD-538, Dirksen Senate Office Building, Senator Dan Quayle (chairman of the task force) presiding.

Present: Senators Quayle and Levin.

Staff present: Alan R. Yuspeh, general counsel, and Lisa M. Tiege, staff assistant.

Also present: Peter Lincoln, assistant to Senator Quayle, and Ralph White, assistant to Senator Levin.

OPENING STATEMENT BY SENATOR DAN QUAYLE, CHAIRMAN

Senator QUAYLE. The committee will come to order.

This is the fifth hearing in which the procurement policy task force of the Senate Armed Services Committee has held hearings this fall. The topic of today's hearing is certainly one of the most important issues that faces the Defense Department: How do we reduce the cost of the acquisition of weapon systems?

This question perhaps more than any other impacts directly on our national security. It is apparent we do not have the financial resources available to permit us to establish numerical equality with the Warsaw Pact countries in conventional weapons.

Accordingly, driving down the unit cost of individual weapons permits us to obtain a larger number of those weapons for the same amount of money, and thus helps us to better address the numerical imbalance between the Soviet military forces and those of our country.

There are two substantially different means by which the cost of weapon systems acquisition can be reduced. First, we can adjust the military requirement; for example, with an aircraft, we might adjust the range, payload, avionics, or other capabilities. Though this is clearly a means of saving money, it also compromises the capability of individual systems.

The question of formulation of military requirements is one the task force ought to be concerned with, and one to which we want to give further attention later. But our primary concern today is with the second means of cutting weapon acquisition costs.

The second opportunity to reduce the cost of weapons once the requirement has been established is to reduce the cost of production. How do we do this? Let me share with you a few of my preliminary conclusions.

Perhaps most important is that we procure weapons systems through a stable pattern of purchases at economic production rates. Today we are buying a number of types of aircraft at a rate of six a year. To build an airplane at that slow motion pace of one every 2 months cannot possibly be economical.

We need to procure systems in economic production quantities, and we need to establish some stability on a year to year basis. I believe multiyear procurement offers an opportunity to do this.

I think that perhaps we have missed a number of opportunities to try to reduce the unit cost of individual weapons systems by refusing to grant multiyear procurement requests. Furthermore, I believe it is absolutely imperative that the Congress and the administration move to a 2-year budget cycle.

Second, virtually every study shows that competition reduces the cost of weapons systems. In a number of systems where the quantity justifies the strategy we have gone to dual sourcing, so there is a countinuing competition between two contractors for the large portion of systems production each year.

If the Government had the capability to know whether or not the production process of a defense contractor was optimal and if the Government had the bargaining power to force whatever changes in production might be required to obtain this maximum efficiency, then dual sourcing would be unnecessary.

But the fact is that the Government does not have the resources to know whether or not the costs incurred by contractors are the lowest possible costs. Accordingly, we need a market mechanism of competition to force contractors to drive costs down.

Third, we should generally use incentive-type contracts. The days of pure cost reimbursement contracts and full scale production should be over. We must always create an incentive for the contractor to minimize costs, and we should do that by sharing with the contractor a portion of the savings it achieves.

This is an outline of the kinds of acquisition strategies that appear to me to be sound in order to minimize the cost in acquisition of weapons systems. It is my expectation that all we can do today is to gain a broad overview of the subject, but I hope that we will have more time in the course of the year to look at this critically important issue.

For example, we may break down the individual strategies that I have mentioned and have a day of hearings on those individual strategies, such as multiyear procurement, a 2-year budget cycle, dual sourcing, and the issue of competition.

Today we are pleased to have three outstanding witnesses. First, the Honorable Everett Pyatt, the Assistant Secretary of the Navy for Shipbuilding and Logistics. Then Lt. Gen. Bernard Randolph, Vice Commander of the Air Force Systems Command. And, finally, Mr. Bill Thurman, Deputy Director of the National Security and International Affairs Division of the U.S. General Accounting Office.

Senator Levin will be with us momentarily. At this time I will call on Mr. Pyatt to commence his testimony, with the assurance that his entire statement will be inserted in the record. You may proceed at your own will.

STATEMENT OF HON. EVERETT PYATT, ASSISTANT SECRETARY OF THE NAVY FOR SHIPBUILDING AND LOGISTICS

Mr. PYATT. Thank you.

I find the description of the framework of acquisition process that you just described one that guides me every day in the things we try to do. Your ideas are a good summary of the things you have to do to have a successful acquisition program.

I will talk a little bit later on multiyear, which has been one of my frustrations, our inability to put together multiyear packages that are good and can sell.

Recognizing that time is important this morning, I will not read my entire testimony, but I would like to go over a few of the points. One of the very first things that the Secretary of the Navy did when we came in was to look at the acquisition process and some of the problems that had occurred in the shipbuilding industry.

We had just come out of a long period of trials and tribulations dealing with claims, and it was a question of how you could get back to the normal operating procedure.

The very first thing as a matter of policy and strategy was to look at competition. In the shipbuilding industry there are many qualified suppliers short of business, and it looked as if relying on competition and broadening the competitive base was a very good way to save some money. Our record is now in, or well on its way toward being in for 1983 and 1984.

Our total shipbuilding program is about $2.2 billion under the budget the President initially requested from Congress. I think that speaks for itself. Also a chunk of that has gone to fund the MX, in which we are pleased to help our sister service.

But our fundamental strategy was based on competition. The analysis that we went through in the last couple of years has drawn a lot of flak. I think we got one article in Time Magazine about underestimating the cost of weapons systems, directed cost estimates. It turned out they, too, were too high, and they formed the President's budget, and turned out to be too high.

We have a problem in estimating cost, and in the past it has been a problem that cost estimates came in too low. Now it is a problem that the cost estimates that form the budget have come in too high.

I think that some of the fundamental acquisition philosophies in terms of practice deal with people, with competition, with design stability which incorporates knowing what you are going to buy and knowing how much you are going to pay for it and sticking to it, and then I think one that is emerging in today's environment is the profit policy of defense.

I would like to cover each of those separately. First of all, we all know that good people are the keystone of any successful operation. It is as true in acquisition as any place else.

However, in the military, over the number of years that I have been involved, there has been a continuing conflict between maintaining a fighting capability and putting good people into the maintenance of fighting capability, which is of fundamental importance to the military, and managing the resources necessary to equip those people.

In the Navy, we have seen various attempts to do something about this over the past 10 years, but Thursday of last week the Secretary and the CNO approved what we believe is a new approach to emphasize systems acquisition and systems management careers, basically the philosophy of integrating sea tours with acquisition tours and focusing the sea tours to support the acquisition responsibilities.

We are going to select people into a group to become our material professionals at a point in their careers that their track record of experience and knowledge is clear. At that time, their warfare specialty—in the Navy's case submarine, air, and surface ship—becomes a secondary profession to them. We have set aside roughly 80 flag officer billets that can be filled only by people who have been through this professional career.

That is a substantial change in the way that the Navy has operated in the past. We hope that it will be successful. Time will tell. But it is a significant change. And from that, if we can get the message out to everybody that this is a career with professional reward possible, I think that the long term of acquisition and material management will be well served. Better weapons at lower cost should be the result.

Second, in doing business with private industry, I think competition is the key. It takes good people to make competition work. Running a competitive program is an extremely tough task. You are pulled and tugged in many different directions by those who believe it is smart, by those who believe it is not smart, and the process of procurement that we have set up. I did not bring a copy of the DAR with me, but it is an astounding document that guides people's actions, astounding in size and what you expect people to know.

We have tried in the Navy to broaden competition to as many areas as we can in ships, in airplanes, in missiles, and I will talk about some of those. The Navy was the first one to institutionalize the idea of a competition advocate general at a flag officer level sufficiently high in the organization to be able to influence the outcome of things.

My view is that this has worked extremely well. It has helped us in the spare parts situation, in getting us to break out in competition for spare parts.

We got our competition awards up in spare parts to over $1 billion in 1984. That is more than double the prior year. And the thing I think is most important is that we managed to change the mode of operation of our contracting system by getting competitive actions. That is, the competitive transactions have doubled in the last 2 years.

I think that is a real change of environment, of institutional philosophy that will probably continue on after I am gone.

Our whole society is built on competition. Our effort has been to try to become a part of that society and reinforce those goals.

In a section I call design stability, performance stability, cost stabilization, cost control, it really comes around to an issue that you alluded to of requirements definition and where you are willing to draw the line.

It is impossible to separate requirements definitions from cost because, with some exceptions in the electronics industry, more performance means more cost. Management has been willing to draw the cost line and hold to it. This is fundmental in controlling costs.

We did it in the DDG-51. It was sometimes very tough to hold things out of the program that people wanted to put in, and we got some guidance by law from Congress on some things that had to go on that we really did not need but it was there. More than guidance, it is law.

I think that one thing in controlling the design is to have contractors who are going to participate competitively during the design phase as much as possible. During the development and design is when the mistakes you pay for in production get built in, and you have got to have a guy in there who recognizes he is going to have to live with his mistakes and hopefully build in some incentives to control cost of production.

In production, we have tried to move to more fixed-price contracting. We are not all the way there. There are more areas where it can be applied that I hope to get to this year, but it serves a couple of very significant issues.

If you are on a fixed-price contract, the contractor is not likely to go along with too many changes, because it is disruptive to his process of manufacturing, and it therefore helps control design changes.

Most important is that it really makes the contractor get into what he is going to build and understand what he is going to build and fully assess the manufacturing risks that he has to undertake.

So fixed-price contracting helps to reinforce cost control, but I still think that in another area, the highest cost risk is the transition from development to production. We have seen many programs go through development reasonably well with what I would categorize as the normal sorts of problems that happen, but then the proposal on the first production line is clear out of sight.

I have seen these kinds of shocks when I was in OSD and I have seen a couple of them in the Navy, that there was a clear indication that something had gotten out of control during development. Even though we had design to cost phrases in the contract, it did not happen. It was not well controlled, and by the time we got into it, we got some serious cost problems, although I will say in one case the threat of competition kept them from being as bad as they could have been by a substantial number of dollars.

Profit policy is the fourth area—our profit policy in defense. I think it is time to sit down and take a good look at it again. As I would look at it, it is really a cost-based profit policy with little incentive to control costs until you build into it a feedback loop on a pretty steep fixed-price incentive share line that says to the gut: If you control costs, you are going to get a substantial chunk back; and if you do not control costs, you are going to lose a lot.

In the areas where we have tried it, it has worked out very well, and it is even better if you can get to a firm, fixed-price contract early. Then the contractor knows clearly his responsibility. Money he makes, he keeps. That puts the responsibility on our back to conduct good, tight cost negotiations.

But those tools are in hand. I think the audit service does a pretty good job of supplying negotiators with analysis. One complaint is that they are a little slow; and we can talk about that later.

I would like to see a profit policy that is based more on risks taken than based on cost incurred. I know the way to guideline policy, and I know how you can get through it. It is a trial of its own.

But I think in areas where we have asked contractors to take on risks associated with tooling and development and test sets and these kinds of things, the design that the contractor came up with to perform the same function under a fixed-price environment was substantially different than what was proposed when they were being reimbursed for the cost. The internal mechanism of creativity somehow occurs under stress.

In the area of facilities, some time ago the Defense Department made the decision to get out of furnishing facilities to defense contractors. There are still some around, and I think we need to more clearly recognize where the Government furnishes facilities, the contractor has not accepted risk to be taken.

The Industrial Modernization Incentives Program [IMIP] is an idea to encourage contractors to undertake development and share the reward—I mean, undertake the risk of capital investment and then share the results with the service and themselves. It is one approach that can be applied in situations where you cannot generate enough risk-taking in the organization to do it on their own.

One area that we intend to look at in assessing defense profits is simply to look at the return on sales or the usual bottom line in a financial report, but when you look around at the investment, look at return on assets, or return on investment of defense contractors, you will find it is sustantially higher than in the private sector, or people who do business in the commercial sector.

That is probably somewhat directly related to the decisions by the Defense Department to furnish our own tooling, make it a fully paid cost while in the commercial sector General Motors has to tool and amortize over its car production.

I think if we spent some time looking at the assets employed in the production of defense that we would encourage new innovation that would be beneficial.

So, these four categories of things are to me the basic tools one in my position has to work with. There is a whole set of specific regulations that are around that we have to implement, but if you have these four areas, and can use them, I think you are pretty likely to be able to come up with a successful cost control program in various mixtures as required by various projects.

That summarizes my statement.

[The prepared statement of Mr. Pyatt folows:]

PREPARED STATEMENT OF EVERETT PYATT, ASSISTANT SECRETARY OF THE NAVY (SHIPBUILDING AND LOGISTICS)

Mr. Chairman and distinguished members of the committee. I am Everett Pyatt, Assistant Secretary of the Navy (Shipbuilding and Logistics).

It is my pleasure to appear before this task force to discuss mechanisms for reducing the cost of weapons acquisition. This has been the Navy's top acquisition priority since President Reagan was elected four years ago. Since then, we have made significant progress in reducing the cost of the ships, aircraft, and other systems we have procured for the 600-ship Navy. We are very proud of our record and we are continuing to aggressively pursue cost reductions.

Let me cite some recent examples of our success. In fiscal year 1983, we executed aircraft procurement contracts at a savings of $645 million from the President's Budget Request for that year. In fiscal Year 1984, savings on aircraft contracts exceeded $300 million. Fiscal year 1983 shipbuilding contracts were executed $1.3 billion below the President's Budget Request. In fiscal year 1984, shipbuilding savings were $893 million. In those two years alone, ship and aircraft savings amounted to about $3.2 billion dollars.

About three weeks ago we announced the first of our fiscal year 1985 shipbuilding contract awards. Those contracts, for four different ship types, were awarded at a savings of $243 million from the President's Budget Request. We also concluded a major aircraft engine negotiation which resulted in a $20 million saving.

I would like to focus on four areas where we believe improvements are essential if we are to continue to achieve cost reductions in weapons acquisition—people, competition, design stability, and profit policy.

PEOPLE

Acquisition program management is the very foundation of good business. We must have experienced and highly skilled people performing program management and contracting functions. Without competent managers, other cost reduction initiatives cannot be implemented to their full potential. All the studies of this problem, including the current draft GAO review of major weapon system acquisition management, agree that proper education, systems acquisition experience, and career incentives are essential to bring high quality people into the acquisition business and keep them there.

This has been one of our most difficult problems. The conflict between the necessity to maintain the Navy as a fighting force, yet capable of effectively managing the resources provided, has been longstanding.

The Secretary of the Navy and the Chief of Naval Operations last week approved a new concept for the development of materiel professionals prepared to manage the acquisition, maintenance and readiness functions. This includes integration of sea tours with acquisition tours for the entire career path, selection to a materiel professional personnel pool at some point (probably after a command) with the warfare specialty relegated to a secondary role, and designation of a set of specific flag officer billets that could be filled only by materiel professionals. The details of this policy are now being developed.

Establishment of such a career path would provide the education, experience, and most significantly, the career incentives required to make our acquisition managers capable, skilled business professionals with the warfare background necessary to properly manage weapon systems acquisition.

I don't want to leave the impression that our current acquisition managers are not competent. We have had occasion to change program managers for reasons of inadequacy, but our program managers are, for the most part, exceptionally fine managers. Our acquisition successes of the last few years demonstrate that fact. The long-term key is career incentives—there must be opportunities for these deserving individuals to rise to the top in the acquisition management field.

COMPETITION

Competition has reduced and will continue to reduce acquisition costs. We seek true competition, not merely the appearance of competition and the award of a production monopoly. The policy of the Secretary of the Navy is to establish and sustain a second source in every appropriate program.

The Navy was the first service to establish a Competition Advocate General. The CAG was charged with pursuing increased competition in procurement of weapon systems, components, parts and services for the Navy and Marine Corps. We have incorporated competition in every area of Navy weapons acquisition, shipbuilding,

aircraft procurement, missiles, torpedoes, ship and aircraft equipment. Much of the savings I cited previously has been due to competition.

In 1981, 73 percent of our shipbuilding contracts were competitive. We have increased that percentage to over 86 percent—in 1984, 19 of 22 ships were awarded competitively. At least 90 percent of new ship construction and conversion contracts in our fiscal year 1985–1989 plan will be awarded competitively.

Construction contracts for Aegis cruisers were awarded competitively in fiscal years 1984 and 1985. The saving from the President's Budget Request in the first 2 years of competition is projected to be at least $382 million. Competition produced significantly more savings than the analysts projected would occur. The mechanisms which operate are not well defined analytically, but the results are always beneficial.

Most of the $243 million savings on our fiscal year 1985 contracts for Aegis cruisers, nuclear attack submarines, landing ships dock, and coastal minehunters resulted from competition.

Competition is a keystone in major new aircraft such as the CV Inner-Zone ASW Helicopter and the JVX Advanced Vertical Lift Aircraft. Competition and dual sourcing have saved millions in missile procurement. For example, we saved $10.5 million on one of seven subassemblies of the Sidewinder air-to-air missile in fiscal year 1984. All of its subassemblies are dual sourced. Four of six of the Harpoon missile subassemblies are dual sourced; $36 million was saved on this missile in fiscal year 1983. This year, we initiated dual-sourcing for both Phoenix and the SM-2 Standard missiles and for the Rolling Airframe missile.

Competition for nuclear attack submarine contracts has led private submarine construction yards to achieve revolutionary breakthroughs in production technology and facilities. Improved fabrication techniques are expected to significantly shorten submarine construction times, from a previous best of 62 months to about 50 months. Contract awards in fiscal year 1984 and 1985 for SSN-688 class submarines resulted in a saving of $184 million from the President's budget request.

Competition is also important in Project BOSS, our program to improve acquisition and reduce the cost of spare parts. The Navy's Competition Advocate General has achieved significant breakthroughs in eliminating or reducing restrictions on data so that we could compete spare parts procurement. In addition, our Inventory Control Points have taken steps to increase competitive procurement. Both the Ships Parts Control Center and the Aviation Supply Office have significantly increased their competition percentages. We competitively awarded $1.0 billion in spare parts contracts in fiscal year 1984. This is a 133 percent increase over fiscal year 1982 and was a result of our two Inventory Control Points (ICPs) exceeding their fiscal year 1984 competitive goals.

In fiscal year 1981, about 25 percent of total Navy procurement dollars were competitively awarded. In fiscal year 1984, our competition percentage was 36.9 percent. During this time, we doubled the percentage of competitive contract actions.

Competition is a powerful economic force and we are trying to use it to the best advantage of the Navy and the taxpayer. Competition has provided us with major cost reductions and significant reduction in delivery time. The supplier base is expanding because of competition and we are witnessing a burst of competitive innovation as more vendors vie for our business. There is room for much more competition; indeed, we need more competition and we intend to see that we get it.

DESIGN STABILITY

Another significant cost reduction mechanism that we are using is design stability and specification control. By defining our requirements more carefully at the outset of an acquisition program, we have been able to control changes during production that, in the past, led to a high cost growth. We have also allowed more contractor participation in design of systems so that designs represent cost saving manufacturing techniques, and to identify, at the onset, the risks for all parties to the contract. By specifying what we need and resisting the tendency to seek the incorporation of the latest improvements during construction, we have been able to move away from cost-plus contracts to firm fixed-price and fixed-price incentive contracts. Moving to fixed-price contracts helps control design changes and requires the contractor to know the risks of the project under procurement.

We recognize that some changes must occur, particularly in systems that are several years in production. When absolutely necessary contract changes are addressed quickly and fairly through equitable change contract clauses and procedures. We intend to maintain and strengthen our discipline on design stability; we believe

more cost reductions will result and we know we can avoid the ragged pattern of past years for which we paid high cost and efficiency penalties.

The highest cost risk period in a program is the transition from development to production. This is when the design faults show up along with the production issues which may not have been adequately addressed during development model fabrication. We are actively in efforts to better manage this critical transition.

PROFIT POLICY

We are also questioning our current profit policy. Contractor profit is now based primarily on projected contract cost. Current policy does allow some latitude in setting the Navy's negotiation objective for that profit percentage based on risk, productivity, and cost of money for contractor capital investment. Existing profit policy does not provide a sufficiently strong incentive to reduce costs.

Philosophically, we think that profit should depend on such things as the added value produced, the amount of risk taken by the contractor, the amount of contractor capital investment and up-front tooling, and amount of cost reduction. There may not be enough latitude or mechanisms within our current profit policy to allow us to set a profit that properly rewards a contractor for his performance in reducing cost and risk he has undertaken.

This is a controversial area, subject to many conflicting policy objectives. There is evidence to suggest that profits on defense work have steadily increased over the last ten years. We have a great deal of work to do on the issues inherent in refining our profit policy. Some of the significant issues concern facilities, working capital, and special tooling and test equipment.

Some defense contractors have government owned facilities and benefit substantially from those facilities. Government policy since the sixties has been to get out of the facilities business. We have not made significant new government investment in facilities, but neither have we moved aggressively to sell existing facilities. The issue is clouded by varying degrees of intermingled government and private investment, but return on assets for defense industry is generally higher than for the commercial sector.

The working capital of many defense contractors comes from government progress payments. Commercial contractors, without progress payments, must finance ongoing work and inventories themselves. This policy results from the fact that government can finance working capital less expensively than can the private sector.

Special tooling and test equipment can be significant expenses at the front end of a major acquisition program. Commercial contractors must capitalize special tooling and test equipment themselves. Again, how much the government should contribute remains a point of contention.

We have taken an important step in the area of capital investment. With the other Services and the Department of Defense, we are now testing the Industrial Modernization Incentives Program (IMIP). This program is designed to provide industry the incentives necessary to finance capital improvement and related management and engineering efforts to improve production efficiency, product quality, reliability and maintainability, and to reduce costs. The program provides incentives to the contractor by allowing the contractor to share in the savings achieved through demonstrated and verifiable cost reduction. We expect IMIP to provide cost reductions in all areas—labor, material, overhead, subcontracts, and software.

The test to date has resulted in nine Navy contractors investing a total of $225 million. The savings projected from these investments is $1.1 billion. The program works. It will enable us to do business even better in the future.

We have just entered the final year of the test of IMIP. We have made some minor revisions in IMIP policy and are now in the four-month period of industry review and comment. We plan to finalize our policy changes, end the test, and fully implement IMIP by the end of 1985.

It is not easy to sort out all the issues concerning investment policy. We do know that the current policy reflects a bygone era when most defense contractors were financially weak. Today the defense industry is stronger, both financially and in production capability. The industry should be more capable of investing in some of the assets currently provided by the government.

We are examining all the aspects of profit policy: How well is the current policy working? Should we be looking at contractor return on assets, return on investment, and other ratios in addition to cost? How can we provide incentives for contractors to make more investments, reduce costs, and take more risks? In the end, we need to resolve what our profit policy should be to ensure that we get the best possible product at the lowest possible price.

CONCLUSION

The response of industry to our acquisition management initiatives has been gratifying. There are no outstanding new construction shipbuilding claims. Costs have come down; productivity has improved. Contractors are aligning themselves to compete for our business; they are investing in improved plant equipment and in new technology to make their operations more competitive.

The Congress has been most supportive and encouraging in our efforts to improve our acquisition process. We intend to maintain the momentum gained and make continuing and lasting changes for the better, by focusing on achievements in cost control. We will continue to develop tight budgets and, through sound management, execute our programs within these budgets. In the Navy, we are totally committed to getting the best value we can for the funds that Congress authorizes and appropriates.

Senator QUAYLE. General Randolph?

STATEMENT OF LT. GEN. BERNARD P. RANDOLPH, VICE COMMANDER OF THE AIR FORCE SYSTEMS COMMAND

General RANDOLPH. Thank you very much, Mr. Chairman.

I appreciate the opportunity to talk a little bit with you about some of the ways that the Air Force is working to reduce costs in acquiring weapons systems.

Before I start, I must tell my colleague from the Navy that I certainly appreciate any help that he can provide for us on the Peacekeeper Program.

Of course, with your permission, sir, I would like to just summarize the statement that I have already provided for the record.

Senator QUAYLE. Please do.

General RANDOLPH. The challenge of reducing the cost of weapons systems acquisition is not only big but, of course, very complex. And one of the things that my colleague mentioned and I want to emphasize is the fact that program stability is an absolutely critical ingredient in meeting the goal of weapons systems acquisition cost reduction.

I want to emphasize the fact that there are not any magical formulas or simple quick fixes which can suddenly make the process of systems acquistion much easier. Across-the-board solutions are not possible.

However, the good news is that we continue to develop many initiatives to provide quality weapons systems capabilities at affordable prices, and the initiatives that I intend to discuss with you today, Mr. Chairman, can be placed in three categories.

First of all, we have procedural initiatives, which are the processes and steps we employ to ensure that Government enters into the best possible business arrangement, and in this category we include such things as acquisition plans, business strategy panels, draft requests for proposals, work measurement standards, competition, independent cost analyses, and more flexibile military specifications.

Unfortunately, I do not have time to go into each one of those, but let me just highlight a couple that will give you an idea of how we proceed in this area. After we have prepared an acquisition plan and a draft request for proposal, we further scrub these documents by using a solicitation review with a panel of experts.

Mr. Chairman, to give you a feel for how tough this is, we refer to these panels as murder boards. Murder boards are composed of technical, management, and business experts who critically review

solicitations prior to sending them out. This is another check to assure that we are following procedures that will result in the most economical approach to acquiring weapons systems.

Let me give you an example, and I will use the alternate Fighter Engine Program. As a result of a solicitation review, we decided to require that the contractors provide second sources for 35 high value replenishment spares. Now, by obtaining these second sources, we of course introduced competition and we have established that competitive environment for the life of the system, and the net result will be an overall savings of about $200 million.

Now, another procedural example is the should-cost analysis. In this case we send a team of experts in manufacturing, costing, contracting, and many other areas into the contractor's plant. That team looks at the contractor's production line and identifies uneconomical practices in contractor management or operations.

During the negotiations we tell the contractor that we will not pay for these inefficiencies, and that he must take steps to correct the situation. Now, of course, this procedure is not necessarily the solution for all cases, but we do have many examples where it helps quite a bit.

One good example that we received in the area of should-cost analysis is in the Peacekeeper guidance and control system contract. Here we found through should-cost analysis that approximately $27 million of the proposed contract price resulted from inefficiencies that should be and eventually were corrected. That $27 million was negotiated out of the contractor's proposed price.

In addition, we then negotiated other reductions which resulted in a final award price which was some 23 percent below the contractor's original proposed price.

Now, those are just a couple of examples of the procedural initiatives. Let us move to something that you referred to in your opening comment and we in the Air Force use quite a bit, and that is incentive initiatives.

In this case we use dollar incentives to encourage the contractor to produce a quality system under cost and ahead of schedule—and I include here such things as the type of contract, and my colleague mentioned the fact that depending on the risk, you tailor the contract so that the contractor can be recognized for taking more risk. Also included are performance incentives, which we use quite a bit in our space programs, value engineering, and reliability and maintainability incentives, and I will talk a little bit about just that latter point.

The Air Force has placed renewed emphasis in the area of reliability and maintainability [R&M]. R&M requirements are not only important because they affect the quality of the system, but they also affect the cost of ownership. Just to be sure we are all on the same ground, I will briefly go through the definition of these two terms, although they are obvious.

By reliability I mean the reliability of the system to perform effectively over a long period of time, and by maintainability I mean ease of maintenance and repair to that system.

Now, R&M translates directly into a lower cost over the life of the system. We motivate the contractor to accomplish these through the use of warranties, guarantees, and reliability incen-

tives built into the contracts. I want to point out with the foresight of the Congress in approving tailored warranties we believe that we have now got a much more flexible tool which will definitely produce better cost savings in the area of warranties.

Now for a good example of the reliability and maintainability initiative, I will go back again to that alternate Fighter Engine Program. In that program, we paid particular attention to R&M, and in doing so we were able to cut our maintenance man-hours per flying hour by better than 50 percent over that experienced in the F-100 engine, and, sir, you will recall that is the engine that we used in the F-15.

The result is that instead of paying approximately $600 per flight hour, we anticipate that the per flight hour cost will be about $250, a significant reduction.

Let me talk a little bit about the third and final type of initiative, and for lack of a better term I will just use the term "other initiative." In this area I place initiatives which try to expand the industrial base, maintain our technological superiority, and better ensure program stability.

Incentives here include baselining, multiyear procurement, which has already been mentioned, and the Industrial Modernization Incentives Program, which was also mentioned.

I am only going to talk briefly about one, and then during the questions we may want to revisit the others. The one I like to discuss is baselining.

In August 1982, the Air Force Systems Command embarked on a major initiative for developing and stabilizing the scope of programs by developing a baseline for the B-1B Program. The objective was to add more discipline to the program process by establishing a firm understanding among all program participants regarding the scope of the program and the dollar constraints.

Now, I believe that the Air Force is the leader in the baseline area, so I thought it would be useful to describe this process a little bit more.

A program baseline is an up front, formal written agreement among all of the involved Air Force managers, including their four-star commanders. The agreement states specifically the requirements to be satisfied, provides a clear definition of a program to meet these requirements, and lays out the funds to be allocated for the effort.

The program baseline is approved only when all three of these elements are consistent, that is, the requirement, the definition of the system, and the dollars necessary to accomplish the job.

The approved baseline forms a firm arrangement. After baselining, any changes must be approved at the same level within the Air Force that approved the baseline itself. We want the system to be stabilized, which of course avoids cost growth.

Therefore, both the initial approval and the approval of any subsequent changes are at a high level within the Air Force. For example, for some of our larger programs, we have vested the approval at the level of Assistant Vice Chief of Staff or the Vice Chief of Staff or the Secretary himself, depending on the program.

As I said, we started baselining and the B-1B Program proved to be so successful that we are now baselining 22 major programs

which represent 80 percernt of the total dollars to be spent on all fiscal year 1986 Air Force Systems Command [AFSC] production programs.

Additionally, all AFSC programs are under review for baselining applicability. In these less-than-major programs, approval will rest with the Commander or the Vice Commander of the Air Force Systems Command.

In conclusion, I me emphasize that these few examples I have discussed with you today in the area of procedures, initiatives, and what I refer to as other initiatives are not by any means meant to be the solution, nor are they all-inclusive.

We cannot apply all initiatives to all acquisitions: nor can we find the perfect legislation or regulation which allows us to immediately reduce weapons systems acquisition costs across the board. I contend that we must be alert to the rapidly changing manufacturing and contracting environment of the future and be ready to adapt to these new situations as they present themselves.

We at Systems Command believe that we have the cost reduction basics in place, and we are making our initiatives work, and you in Congress, of course, sir, have been eager to help, and we appreciate that assistance.

Mr. Chairman, that completes my statement.

[The prepared statement of General Randolph follows:]

PREPARED STATEMENT OF LT. GEN. BERNARD RANDOLPH

Mr. Chairman and Members of the Task Force. Thank you for the opportunity to meet with you to discuss ways to reduce the costs involved in acquiring weapons systems. I can assure you that this subject has been and continues to be a top challenge within the Air Force and particularly Air Force Systems Command (AFSC).

The challenge is not only big but very complex. We in Air Force Systems Command are meeting this challenge with a team approach. In conjunction with our program offices, the Headquarters uses initiatives generated by the field to focus the Air Force effort toward the objectives of cost reduction and good program control—while at the same time providing quality weapon systems. Program stability is an absolutely critical ingredient that is integral to meeting the goal of weapon systems acquisition cost reduction.

I want to emphasize that there is no magical formula or simple "quick fix" which can suddenly make the process of weapon systems acquisition easier. In fact, I know of no single rule, regulation, or law that can broach the multitude of complex variables involved in the process of weapon system acquisitions. As attractive as a legislative or regulatory solution may be, the process of procuring weapon systems takes extremely careful consideration by an experienced team of management and technical experts applying many different tools and techniques to each unique acquisition—all intent on obtaining the best and most cost-effective result. I too would like an easy and straightforward simple answer, but I am here to assure you that having spent almost an entire career in this business—such answers are not possible.

However, the good news is that we continue to develop many initiatives to provide quality weapon systems capabilities at affordable prices. Our measure of success is being able to meet as many of the requirements of the operational forces as possible—within the constraints of limited resources. These many initiatives can be viewed in three categories.

First are the "procedural" initiatives which are the processes and steps we employ to assure that the government enters into the best possible business arrangement available. To accomplish this we have developed, in AFSC, management techniques to assure we follow good business practices throughout the acquisition process. Some of the techniques we use are: Acquisition Plans, Business Strategy Panels, Draft Requests for Proposals, Solicitation Review Panels, Mil Standard 1567A, "Work Measurement", Should Cost Studies, Competition, and Military Specifications.

Second are what we call the "incentives" initiatives which are the various approaches used to translate the proposed business arrangement into actual contrac-

tural requirements. These are designed to incentivize the contractor to produce a quality system, under cost and ahead of schedule. Here we are talking about: Contract types, Performance Incentives, Reliability and Maintainability and Value Engineering.

The third type of initiative is those "other" initiatives that are not program or contract specific, which are now in use by the acquisition community, to further promote economies and efficiencies. These are basically designed to expand the industrial base, maintain our technological superiority and better ensure program stability. Examples here are: Baselining, Multiyear Procurement, and the Industrial Modernization Incentives Program.

I hope you can see the problem is, in fact, complex, yet we feel that a comprehensive effort such as we have will not only better enable us to reduce current weapon systems acquisition costs but—more importantly—get us out in front of projected changes in the whole scheme of manufacturing methods and techniques of the future. I will not explore various examples of the three types of initiatives that I've just outlined, with the rest of my statement.

Let's face it, contracts are, "where the rubber meets the road," with respect to cost control. The first consideration, and key to cost-effective acquisition, is ensuring effective contractual implementation of good business practices. This isn't a problem unique to Government; it's the same problem faced by every business enterprise—how to bring the best business expertise to bear on a specific acquisition—how to get what you want, when you want it, and at the "right" cost—and all translated into the "right" contract!

Acquisition planning is required on every procurement, but for major acquisitions, we utilize a formal "Acquisition Plan." This document covers, in detail, key contractual issues, such as the amount and timing of future acquisitions; delivery requirements; cost, technical, and schedule risk; competition; type of contract; logistics planning; life cycle cost; and many other issues. This ensures a coordinated approach is used. This document serves as the touchstone for action throughout the life of the acquisition; as such, it is carefully screened by top management and key business experts to ensure its integrity as an "action" document.

Business Strategy Panels [BSP's] perform much the same function as Acquisition Plans. However, they provide an opportunity for a face-to-face exchange of information between the participants. Early in the planning cycle for major contracts, we hold BSPs. The participants are technical, management, and business experts. We seek the best talent available; it is not unusual to have representation from Headquarters USAF and the Secretariat. These personnel develop the best approach to accomplish, contractually, the goals we set for ourselves in the Acquisition Plan. For example, if an Acquisition Plan calls for a warranty, the BSP would hammer out the best business approach to getting a good warranty; what should be warranted, or how long, key warranty provisions, how to limit impediments, and similar issues which ensure that what we do makes good sense and within appropriate cost control.

Our efforts are not limited to seeking just the best ideas from Government personnel; we also utilize a "Draft Request for Proposal" (Draft RFP) procedure to take advantage of expertise that exists in industry. Essentially we are asking industry for its view of the critical cost-driver requirements. What we expect to get out of using this technique is, with a slight "tailoring" of requirements, we can produce substantial improvements in cost. Under this procedure, a "draft" RFP is issued to industry in advance of the formal solicitation. The goal of this procedure is to establishe a dialogue between ourselves and industry, giving industry the time and opportunity to "scrub down" our solicitation and recommend ways to "get out the fat." I do want to point out that this is one example of the kinds of successful initiatives being currently used—that do not get front page press coverage.

Another procedure used to good effect is Solicitation Review Panels, or as we call them, "Murder Boards." Murder Boards are composed of technical, management, and business experts who critically review solicitations prior to issuance. Every aspect of business approach, technical requirement, and document quality is scrutinized, and changes made when necessary. This is another check to safguard against excess costs which can result from inappropriate requirements or poorly written documents. An excellent example here is the Alternate Fighter Engine program. In the review board consultations a solicitation was structured so as to require the contractor to propose a plan for competing the thirty high value spares requirements requiring the development of second sources and then factoring the associated cost change into the total system cost—a significant savings resulted.

An excellent example of contractual tools to reduce costs is the Mil Standard 1567A "Work Measurement." This is a powerful tool to monitor and impact direct

labor performance. The technique requires contractors to develop objective standards of performance (the time and skill level required to perform a task) for manufacturing processes used in production. Actual performance by the contractor is then compared to these standards. It acts to increase discipline and effectiveness in work measurement systems. This allows both the contractor and the Government to identify areas of production which are inefficient, targeting them for management attention. I want to emphasize that this is to the advantage of both the government and the contractor. The use of 1567A enables us to address production problems before entering a contract, breaking our dependency on historical performance in pricing and the "cost-based pricing" approach.

AFSC is strongly committee to applying Mil Standard 1567A provisions and using the data to monitor contractor performance. We are striving for, where appropriate, factory-wide implementation, and to increase management use of data to drive productivity improvement.

Survey results indicate that AFSC leads the DOD in Mil Standard 1567A application. We still, however, have some way to go to meet our goal of full utilization of appropriate contracts (contracts that meet the threshhold guidelines) by applying this standard.

I have talked about some basic common-sense types of procedural initiatives but I want to give you a specific example of actual cost-savings.

My example is "Should Cost." This extensive, in-depth, costing analysis by a multi-disciplined team, evaluates the costs and efficacy of contractor approaches to fulfull program requirements. This identifies uneconomical or inefficient practices in contractor management and operations. The bottom-line objective is to develop realistic negotiation objectives. We recognize Should Cost Analyses as an extremely valuable tool and we are currently revitalizing our policies to assure that this tool of cost reduction is used at the right time in the life cycle of a system. Briefly, Should Cost usually makes most sense when we enter into the first full production buy of a system or when significant changes in program structure or production configuration occur. Again, this is not the solution for all cases. AFSC is exploring a multifaceted approach to improve existing Should Cost guidance.

A good example of Should Cost savings is the Peacekeeper Guidance and Control System contract. Here we found through a Should Cost analysis that approximately $27 million of the proposed contract price resulted from inefficiencies that should be and were corrected. That $27 million was negotiated out of the contractors proposed price. Plus, we then negotiated other normal reductions, resulting in a final award of $233 million. The actual Should Cost effort cost us only $6.5 thousand for a cost/benefit ratio of 1/4179—not bad at all. Another example is the Peacekeeper Reentry Systems and Vehicles contract where we got a $28 million cost reduction due to Should Cost from a total contract of $256 million—a 1/1499 cost/benefit ratio!

At AFSC we are taking a number of positive steps to reduce weapon systems costs by increasing the amount of competition. But it is important to note that this concept is not new at all to the Air Force. We've been involved with competing systems for many years—as far back as the early 70's with the A-10 and A-9 competition. In fact, competition is another example of not getting much press attention or DOD not receiving much credit at all for fostering as much competition as really occurs. This is due to the fact that a significant portion of the competition that takes place is the sub-tier or sub-contract level where the prime contractor employs the competition concept, with our support, and passes along quite a bit of the savings to the government. We have set up dedicated competition advocate organizations at both the field and headquarters levels.

A Command Competition Plan has been written which details our corporate strategy and identifies targets of opportunity. We further have established a command competition advocate, as directed by the Congress, but more importantly have him reporting directly to the Commander of AFSC. So we have been moving but we need to continue forward. Currently, we are executing the competition plan through several means. First, we have established competitive goals for every buying organization. We are monitoring their progress closely and are participating in business strategy development to ensure competition is managed through each program phase. Secondly, we have established a quarterly workshop program where AFSC advocates share competition-related problems, progress, and lessons learned. Third, we are conducting an intensive education program by interacting with industry, Government, and professional associations.

Competition advantages are many. The full range was recently demonstrated in the Alternate Fighter Engine Competition. The competition for a new fighter engine culminated this year with a split award to two major suppliers. That ensures that competition will continue into the future. The strategy will save the government up

to $3 billion in the 20 year life cycle costs of ownership. Because of the aggressive competition, we'll have much improved engines, enhanced warranties, an enlarged industrial base, and better protection against production disruption.

AFSC's commitment to increase competition is also manifest in a contracting tool actively used by the product division commanders—the Competition Advocacy Program. Last year advocates at Headquarters and the product divisions helped convert about $400 million from noncompetitive to competitive buys. So far this year, $280 million of prime contracts and $500 million of subcontracts have been converted.

The encouraging competitive profile is evident in the three general categories of Command procurement statistics: price and technical design competition; follow-on competition, which refers to contracts originally awarded competitively, but now produced by a single source; and sole source. In FY 83, only 7 percent of our obligated dollars were sole source, 28 percent were competitive, 65 percent were follow-on to competition. Statistics so far this year show a similar trend. It's a good profile.

We estimate that 35 percent of the dollars paid to our prime contractors flow to first tier subcontractors. About 40 percent of those dollars are competitively awarded, many at AFSC's instigation and direction. We're taking an active role in the prime contractor's selection process, to the point of institutionalizing subcontractor competition.

The last procedural form of incentive I want to highlight today is that of Military Specifications. In the process of trying not to over influence a solution to any particular RFP, we have been guilty in the past of sometimes over specifying our requirements. In order to correct this deficiency three acquisition practices have been started. These are the use of MIL-PRIME specifications when available, constrained tiering of specifications; and tailoring of specifications.

The MIL-PRIME specifications have the attributes of replacing "design to" requirements with "operational/performance" requirements. When applying a MIL-PRIME specification an extensive appendix to each one is prepared which provides rational for requirements, guidance for tailoring, and relevant lessons learned from previous systems developed.

Currently, 20 MIL-PRIME specifications have been released and available for use, 22 are scheduled for release in fiscal year 1985, and 11 are scheduled for fiscal year 1985, and 11 are scheduled for fiscal year 1986. The B-1B, T-46 and Joint Advanced Fighter Engine programs have all used one or more MIL-PRIME documents. In the interim, constrained tiering of specifications and tailoring of specifications where MIL-PRIMEs are unavailable have been utilized.

These techniques, and others which I haven't mentioned, ensure that technical oversight and business management input occur at critical times in the acquisition cycle. We are not talking here of a, "one time shot," but rather an approach of consistent and continuing management input at key points in acquisition development.

Now—I have covered some of the procedures we use to ensure our contracts keep costs down—what are some of the approaches which might actually be recommended?

One of the principal tools the Air Force uses to motivate contractors to control costs is the contract type. This is where we tailor the contract type to the size of the risk involved. The higher the risk, the more of the risk the government assumes and vice versa. When we write contracts we can extract better performance and cost control by selectively choosing the most appropriate style of contract for the individuals procurement. Again, this is not really new, nor is it an all-inclusive answer—but it is an effective tool.

Air Force Systems Command uses contracts that vary from pure cost contracts to firm fixed price contracts. In selecting the appropriate contract type, the contracting officer assesses the risk related to cost, schedule, and the government's ability to define the technical requirement. Based on the contracting officer's assessment ot these areas, he selects the appropriate contract type that will best motivate the contractor to deliver a quality product under the target cost or firm contract price.

We might recommend that contracts contain various incentives. For example, there may be performance incentives with rewards for superior technical performance, and penalties for poor technical performance. These performance incentives are frequently used in satellite acquisitions, where the help ensure the best contractor performance. The overall cost to the Government is reduced, because the improved performance which is achieved reduces the number of units which must be produced.

Cost incentives may also be used. Cost incentives directly motivate the contractor to control costs, by tying profit or fee to thses costs. I want to say here that what we do with incentives is carefully constructed to be in the interest of both the contractor and the government. He gets the share in the savings. The technique increases

contractor profits and the overall cost to the government is reduced; likewise, a contractor who fails to meet cost goals loses profit or fee. When properly used, these incentives are powerful tools; helping us acquire high quality weapon systems, while controlling costs.

But, there is more to cost control than just contract incentives. Effective cost control demands an integated approach, with contractual provisions that complement one another, working in concert to accomplish our cost and performance goals. One example is in the area of data rights. It is often necessary, for instance, to acquire rights to data under our contracts. This data might be necessary for future reprocurement, to ensure future full, free, and open competition, and to avoid sole source situations. Balanced against these positive aspects is the fact that data acquisitions are often very expensive. Smart business decisions in this area, with intelligent trade-offs, don't just happen, they are an outgrowth of the management approaches outlined earlier.

Reliability and maintainability (R&M) requirements often play a key role in keeping costs low, while ensuring weapon system effectiveness. The Air Force has placed renewed emphasis on R&M. R&M requirements are important because not only do they affect quality but also the cost of ownership of a weapon system. By "reliability," I mean the ability of a system to perform effectively over a long period of time. By "maintainability," I mean the ease of maintenance and repair to that system. These considerations are important because high R&M gives us a "force multiplier" effect, where fewer systems are needed to accomplish a given mission. This translates directly into lower cost over the life of the system while in the field. R&M must be designed into a system; they must be key considerations from the earliest engineering and design efforts. We motivate contractors to accomplish these actions through the use of warranties, gurantees and reliability incentives built into our contracts. I want to point out that with the foresight of the Congress in approving tailored warranties, we can significantly reduce the cost of ownership of weapons systems. I am further pleased that you too recognized that one single type of warranty is not the answer—that we must be flexibile and not fall into the "cookie cutter" mold of trying to reduce weapons systems acquisition costs.

Where appropriate, we place in our contracts clear and unambiguous requirements for R&M. We use our business experts in the structure of these requirements, to ensure the requirements are measurable, verifiable, and enforceable. Contractors who fail to meet required R&M levels forfeit profit or fee. Those who exceed the levels are rewarded by increases to profit or fee. These provisions get the attention of our contractors; the cost savings available from this approach are significant.

The F-16 AN/APG-66 radar had a reliability improvement warranty covering nine avionics line replaceable units. The contractor was responsible for repairing and/or updating the LRUs for a period of 300,000 flight hours or 48 months. This resulted in a radar with a MTBF of approximately 45 hours representing a five-fold increase over the F-11D radar.

The C-17 advanced transport aircraft has a warranty from McDonnell Douglas to achieve a mission completion success probability of 93 percent. If the warranted performance is not achieved, the deficiencies will be corrected at no additional cost to the Air Force. For example, the Pratt and Whitney engines on the C-17 are warranted to get 100 percent of the required parts and labor free for up to 3000 hours of operating time (equivalent to three years of normal use).

In our alternate fighter engine (AFE) program we paid particular attention to R&M, for example, maintenance manhours per engine flight hour and engine removal rate. As a result, we anticipate a reduction in the engine removal rate of better than 50 percent over what was experienced on the F100. Instead of the F100 cost of $585 per flight hour, we anticipate a per flight hour expense of only $200 to $300 for the AFE.

Through R&M analyses we reduced the F-15A electronic parts count from 12,160 on the F-4E to 6,600.

R&M on the ATF has also received increased attention. The fighter will be designed to require fewer maintenance personnel and less support equipment. For example, the sustained sortie generation rate has to be at least twice that of the F-15 and require only one-half of the number of C-141s needed to move a squadron.

Another important contractual tool is our Value Engineering Program. Under this program, contractors volunteer methods to perform contracts more economically, then share the savings with the government. Value Engineering attempts to eliminate, without impairing essential functions or characteristics, anything that increases acquisition, operational, or support costs. We have found this program to be effective in reducing weapon system costs without impairing essential system performance requirements. But we also found that this particular tool must be applied

very carefully because its use only makes sense during stable program configuration and somewhere near, or in production.

Two good examples of Value Engineering are the C-5B Program and the Maverick Program.

The $16.6M C-5B savings resulted from use of carbon brakes instead of the Beryllium brakes used by the C-5A. Carbon brakes will also be used as the spares for both C-5A and C-5B. Beryllium is highly toxic and therefore difficult to manufacture; it is also more costly a material than carbon.

The $172.8M Maverick savings resulted from circuit board product improvements. Specifically, there was a conversion to five large scale integration (LSI) chips from nine labor-intensive hybrid circuit boards, conversion from three analog components to discrete compact electrical units, and other small electronic improvements.

The last two initiative areas, procedures and incentives, briefly cover the contractural aspects of reducing the cost of weapon systems acquistions. Our efforts, of course, go beyond just contractual procedures and controls. The third initiative area was the "other" initiatives we have taken outside of specific programs in order to reduce the acquisition costs.

In August 1982 AFSC issued implementing instructions on a new approach for developing and stabilizing the scope of programs. The objective was to establish a mutual understanding among all major program participants to establish what is within the scope of the program and what is not. The primary goals being program stability. This understanding is formalized by means of a written agreement or "program baseline." The program baseline addresses all of the major aspects which define the scope of the program including system definition, technical and performance parameters, operations concept, system readiness parameters, maintenance concept, business approach, training, facilities, schedule, quantities, and cost. The intent is to document the system cost drivers early enough, and at a high enough level, to force program stability and control cost growth.

A program baseline is an up-front formal written agreement between all involved Air Force managers which states the specific requirements to be satisfied, provides a clear definiton of the program to meet these requirements, and lays out resources to be allocated for the effort. The program baseline is approved only when all three elements are consistent. The approved baseline forms a firm arrangement whereby HQ USAF agrees to support, through the budget cycle, the necesssary resources and the developer (AFSC) along with the using, supporting, testing, and training commands collectively promise to deliver the required product on time within cost. After baselining, any changes must be approved at the same level within the Air Force that approved the baseline itself. We want the system to be stabilized, which avoids cost growth; therefore, both the initial approval and approval of any subsequent changes are placed at a high level within the Air Force. For example, on a limited number of a larger programs we have vested the approval at the level of the Air Force Vice Chief. All others will be approved by the Assistant Vice Chief of Staff.

An example of the process is the T-46A program baseline. The signatories are the program manager, the commanders of Aeronautical Systems Division, Air Force Systems Command, Air Force Logistics Command, Air Training Command, Air Force Operational Test and Evaluation Center, and The Vice Chief of Staff of the Air Force. They will agree to the following key items: a current program estimate of $3.5 billion, a quantity of 650 aircraft—designed to do a specific mission, a DT&E schedule of April 1985 to January 1987, a first flight of April 1985, and an initial operating capability of January 1988.

Twenty-two programs are baselined or are in the process. All AFSC Programs are under review for baselining applicability within the 1986 President's Budget.

Baselining is an initiative that will take time for its benefits to be fully realized. Additionally, although the Air Force has moved out to institutionalize baselines, we are not the only player that can influence their success. For the full potential of baselines to be realized, the process must be institutionalized through the total budget process.

Closely coupled with the baselining program is multiyear procurement. This initiative is one of the best ways to stabilize programs and save money. A multiyear contract is one that commits the government to more than one fiscal year of requirements. Each program year is annually budgeted and funded and, at the time of contract award, funds are only appropriated for the first year. Subsequent year funds are added to the contract at the beginning of each fiscal year. In the event that subsequent year funds are not appropriated, the contractor is protected against loss by contract provisions which allow reimbursement of costs included in a cancellation ceiling. Only programs that clearly have stable requirements, funding, and

configuration are acquired on a multiyear basis with high confidence in savings estimates and contractor capabilities.

The main benefit of multiyear contracting is reduced cost through economic lot buy of materials and more efficient production processes. Since the contractor has several years of firm business they can allow subcontractors to produce at more efficient rates and amortize investments in cost-reducing tooling over an extended business base. Economic lot purchases of materials and components for all end items in the contract are also normally structured to maximize multiyear savings. So far, we have experienced savings ranging from 7 percent to 25 percent with an average of around 12 percent.

With the assistance of Congress, the Air Force now has six major programs under contract using multiyear procurement techniques, with projected cost avoidance in excess of $2.8 billion.

Several examples of multiyear procurement include the NAVSTAR Global Positioning System (GPS), the Defense Meteorological Satellite Program (DMSP), and the Defense Satellite Communications System (DSCS).

GPS is in its fourth year under a multiyear contract for 28 satellites and will result in a cost avoidance of $212 million. In addition, the NAVSTAR contractor, Rockwell International, as well as several of Rockwell's subcontractors, have invested over $420 million in productivity enhancements and facilities expansion as a result of the multiyear procurement commitment. Specifically, because of this multiyear contract and the associated program stability, Rockwell made its own investment of $30 million for industrial base improvements. In essence, their entire production line was redesigned from start to finish and produced dramatic improvements in manufacturing efficiencies. Additionally, Rockwell built new test facilities which, when combined with the production line modification, will now make Rockwell a much more effective competitor for future spacecraft development contracts. Thus enhancing the competition and the defense industrial base.

The Defense Meteorological Satellite Program (DMSP) is in its final year of a three year multiyear procurement of four satellites which will result in a cost avoidance of $58 million.

The Defense Satellite Communications System (DSCS) multiyear procurement was initiated in fiscal year 1984 with expanded advance procurement for seven satellites. Congress subsequently approved going full MYP in the fiscal year 1985 Appropriation Bill. In November 1984, we awarded the full multiyear contract valued at $636 million for a total savings of $140 million.

Finally, it is no secret that over the past decade the loss of U.S. industrial preeminence, in particular our aerospace industrial preeminence, is directly related to the decline in the rate of productivity growth. The need for imaginative and effective ways to improve the responsiveness of our defense industrial base cannot be overstated. We must insure the nation of a modern, capable military force which is prepared to respond to a variety of contingencies. Furthermore, the weapons systems deployed by this force must be obtainable at a price the nation can afford. It has been documented that our defense industrial base capability has been declining in recent years. The nation's annual productivity improvement rate has been low compared to some other industrialized nations. Our ability to respond to surge production is impaired. The technologies employed to produce our weapons systems have not kept pace with the technologies of the systems themselves. Many defense contractors have been characterized as being very conservative in their capital investments for new technology and equipment. Some of the reasons for this strategy include: program instabilities (annual buys; stretch-outs) which increase the uncertainty of return on investment; cost-base contracting which appears to reward contractors for maintaining, rather than reducing cost; high interest rates; and uncertainties of future program. In the late 70s the Air Force began efforts to motivate prime contractors to become more efficient and productive through the introduction of new technology and equipment. Technology Modernization programs became a tool for acquisition managers to reduce cost of our weapons systems while strengthening the industrial base. These programs are essentially arrangements containing both business and technical elements. They have been called "TECH MODs", "Get Price", and Industrial Productivity Initiatives. Recently, the term Industrial Modernization Incentives Program (IMIP) was coined and applied as a DOD tri-service term to programs of this nature.

Generally, Tech Mods/IMIPs are accomplished in three phases. During Phase I, a structured factory analysis is performed to determine what modernization should be initiated. This phase provides an analytical basis for the development of a strategic plan to revitalize the factory. Phase II focuses on preliminary and detailed factory modernization efforts for high-cost manufacturing areas requiring improved factory

operation. This phase establishes and validates enabling technologies and the development of detailed implementation plans to effect the modernization. Phase III implements the modernization. In this phase, detailed factory designs are updated and enabling technology projects, including hardware and advanced computer-controlled manufacturing cells and centers, are completed and put on line. Complementary advanced management information and the necessary capital equipment required for implementation are also installed during this final phase.

There is no magic in the Tech Mod/IMIP concept. Simply stated, IMIP is designed to share the benefits with the contractor as an incentive to make the necessary investments to reduce the acquisition cost. The Air Force, in return for this industry commitment, accepts a portion of the technical and financial risk by providing "seed money" to be used to identify factory needs and develop the manufacturing technology necessary to satisfy those needs. The resulting savings generated from implementation are then shared based on a negotiated return on the contractor's investment.

AFSC is moving out to modernize all areas of our industrial base. Thirty-two major IMIP efforts are on contract involving over 80 DOD contractors, both at the prime and subtier level. The bottom line of our joint efforts is an estimated cost avoidance on our weapons systems programs in excess of $4 billion.

After hearing about IMIP you may ask: "Why is it necessary? Why do DOD contractors not invest on their own without Air Force involvement?" We asked industry these questions in our recent 1984 PBA. Their unabridged response was as follows: "The uncertainties of defense business, coupled with cost based contracting practices, have created an environment in which commercial sales are much more influential on capital investments than military sales. This is particularly true in those areas in which a company has a mix of commercial and military business." Their message is loud and clear. We, the military, must continue to do smart things like IMIP to make defense business more influencial in encouraging capital investment and subsequent productivity increases.

Having reviewed many of the tools and techniques at our disposal today to combat rising weapon systems acquisition costs, program stability is the biggest challenge we face in keeping those costs down. Everyone must understand that there are forces external to DOD that play a significant role in the costs of weapon systems. So not only are there many factors to be considered before applying the proper tool or technique at our disposal in DOD--there are many factors such as variable interest rates, inflation and the annual restructure of the budget which greatly affect program stability. We must together stay aware of these influences and be as flexible as possible to cope with them.

In conclusion, let me again emphasize that these examples of initiatives in the areas of procedures, incentives, and what we referred to as "other" types are not by any means meant to be "the solution." Nor are they all inclusive. We cannot apply all initiatives to all acquisitions, neither can we find the "perfect" legislation which allows us to immediately and significantly reduce weapon systems acquisition costs. As I said, the "cookie cutter" mold approach just doesn't work in this complex business. I also contend we must be alert to the rapidly changing manufacturing and contracting environment of the future.

We at AFSC believe we have the basics in place—and we are making it work. With your assistance we can make it even better. You in the Congress have been eager to help and we appreciate that.

The challenge is great but so too is the need to fulfill the trust the American taxpayer places in each and everyone of us who spends tax dollars. What I want to get across today is the fact that we in the Air Force have recognized the problem, have stepped up to it, have our best minds designing every conceivable method of making the system work more efficiently—and more importantly—won't stop until we can produce weapon systems, so absolutely critical to our national defense, in a cost effective and affordable manner.

This completes my statement. I look forward to discussing the areas referenced in the letter announcing this hearing, and I'm prepared to answer any questions you may have.

Senator QUAYLE. Mr. Thurman?

STATEMENT OF BILL W. THURMAN, DEPUTY DIRECTOR OF THE NATIONAL SECURITY AND INTERNATIONAL AFFAIRS DIVISION OF THE U.S. GENERAL ACCOUNTING OFFICE

Mr. THURMAN. Good morning, Mr. Chairman.

We, too, appreciate this opportunity to come and share with you the results of some of our work in this very important area.

I think one thing I would like to say up front is that we in GAO certainly agree with the theme that has been running through the statements so far, that stability is probably the key to coming to grips with the cost of major weapons systems. Let me describe briefly the kinds of studies that we have conducted over the years.

For a number of years GAO has reviewed on an annual basis selected major weapons systems. These reviews have been done over the past 15 years or so, and they have identified issues on individual systems that we bring to the attention of the Congress and the DOD for their use in the decisionmaking process. Issues such as the ability of a particular system to meet its performance goals and user needs, and such things as the adequacy of testing and evaluation of systems that are in the development phase.

We also have conducted some work and some evaluations on issues that tend to be more systemic and cut across the individual weapons systems themselves.

I think from my perspective, and this might be useful to share with you, I think looking back, the military weapons systems acquisition process from our vantage point has been characterized by programs which are extended, exceed original cost estimates, and result in fewer units than were originally planned.

DOD has attributed most of the cost growth to: (1) Quantity increases that were driven either by a threat change or the need to meet original objectives, or (2) inflation. We certainly agree that those have been two of the major contributors, but would add a third, and that is the pattern that we have observed over the years of overoptimism in cost estimating, which seems to us to transcend most of the reasons for cost growth.

In our view, realistic cost estimates are essential to maintaining stability in the acquisition process. Overly optimistic estimates of future costs of major systems results in a couple of things—trying to fund too many acquisition programs with the result that too few are produced at the optimum level and most efficient production level, and continuing lower priority programs on the assumption that adequate future funding will be available.

I think it is probably fair to say that we do not pretend that there are any easy solutions to some of the issues we see, and this reinforces the views of my colleagues, but we have been impressed by the attention that the DOD has devoted over the past few years to its management improvement efforts in the acquisition arena. Some of these effects have been discussed by Assistant Secretary Pyatt and General Randolph.

Let me share with you, if I could, some results of work that we have performed on the 5-year defense plan. As you know, that is a key document for making tradeoff decisions and looking at the future and where we are headed with respect to individual programs.

In recent years there has been a great deal of controversy over the accuracy of the cost projections in the 5-year defense plan [FYDP]. We have studied the historical relationship between the amounts estimated in individual FYDP's and the total obligation

authority ultimately approved or appropriated to execute those plans.

The analysis showed that for the 20-year period since 1963, the FYDP consistently understated budget requirements for the third, fourth, and fifth years by an average of 14 percent, 26 percent, and 38 percent.

In looking at that data with respect to individual weapons systems, and we took a look at some 97 weapons systems, that means that the Congress has historically had to grant on the average 32 percent more funds to complete the weapons programs than was estimated in the 5-year defense plan.

DOD has pointed out, and some of the initiatives that you have heard about this morning are in that general vein, that they believe they have come to grips with this problem and have instituted procedures which will result in more realistic plans in the future.

I think the proof will be in the effect on overall defense program costs and execution. Much will depend on whether the estimates in DOD's 1982 to 1986 FYDP's are in fact more accurate than in the past. If these FYDP's are in fact a reflection of better procurement planning and cost estimating, we should expect to see the level of total obligational authority required to more closely approximate the FYDP figures as one indicator of progress.

A second indicator will be the degree to which defense programs are fulfilled within planning estimates. We think it is very important to have accurate estimates, because multibillion-dollar tradeoff decisions are being made and it is very important that the Congress and the DOD decisionmakers have the most accurate information possible.

Let me just briefly share with you some other studies that we have conducted. We recently took a look at the process involved, and Assistant Secretary Pyatt mentioned this subject, in transitioning weapons systems from development to production. We find that for many sophisticated weapons systems manufacturing the weapons on time and within cost goals during the early stage of production has proven to be as difficult as developing the weapon itself.

Cost growth and late deliveries have consistently impeded our attempts to field new weapons systems. We took a look at six weapons systems in depth in the form of case studies to identify some of the causes of early production problems, and to attempt to outline some actions that we thought would help minimize their occurrence in the future.

Among the four that experienced problems, the Copperhead, the HARM, the Black Hawk, and the Tomahawk, their entry into the production phase proved to be much more difficult than was anticipated, as was evidenced by late deliveries, cost increases, and restructured programs.

Basically what we saw going on in those four programs was production planning, and efforts to prove out the production process in the development phase were taking a back seat to coming to grips with the technical problems that were being encountered as the weapons moved through the development phase.

On the other hand, taking a look at the F-16 and the Air-Launched Cruise Missile, we did not see that same level of difficul-

ty in the transition to production. In both of those programs, what we saw was a series of production planning actions, including such things as producibility studies, production line and factory layout efforts, tooling purchases, and so forth, as well as some demonstration that the capabilities and resources that were needed to begin production were in fact present before we moved those systems into production.

Recently, in our view, DOD has taken a very important policy step to recognize the importance of coming to grips with production difficulties or production issues before moving into that phase of the acquisition process. They issued directives in January 1984 which call for a balanced treatment between production preparation and the other technical demands involved in the development process.

We saw in those programs that worked reasonably well that program management from both the service level as well as the contractor level devoted a significant amount of attention and time to assuring that the production capability was there and ready to go.

And another factor that we noted in those two programs was that where the transition was relatively smooth, both the funding and quantity of the systems to be acquired were relatively stable.

We think that overcoming transition to production problems will require DOD to fully fund the necessary production preparation efforts even if it means starting fewer programs or refusing to produce weapons systems when the production capabilities are inadequate or unknown.

Turning to multiyear procurement, much has been said this morning about the advantages of multiyear. You mentioned it, sir, in your opening statement.

In 1982, as you know, the Defense Department received authorization to expand its use of multiyear contracting and our work on multiyear has shown that indeed savings are resulting from the approach. For example, recently we completed a fairly extensive case study of the Army's Black Hawk Helicopter Program, and concluded after a fairly serious scrubbing of the matter, that at least $37 million would be saved as a result of the multiyear contract.

GAO has supported the multiyear approach, but we have expressed the view that there is a need to carefully analyze multiyear contracts because there are some risks associated with the approach.

Let me turn quickly now to dual sourcing. As has been suggested, dual sourcing has been viewed as a means to assure competition in the acquisition process. We recently completed a review where we took a look at Army and Navy and Air Force uses of dual source procurement.

And on the basis of that review we concluded that awarding a larger share of production quantities to low price dual source suppliers can in fact provide an incentive for price competition.

If memory serves me right, of the items that we looked at in that particular study, we found that about half of the second source or the second dual source suppliers has been able within a comparatively short period to come on board with a price for the particular unit that was competitive with the original source supplier.

One caveat that—I guess GAO is expected to offer caveats--we would have is that using dual sourcing for production cost competition can only be effective when the downward prices resulting from that competition outweigh and exceed the cost to the Government to develop and maintain the second source capability. Therefore, we are of the view that the DOD in using the dual source approach should perform a cost benefit analysis of the particular dual source procurement under consideration.

Finally, let me share with you one additional study that we completed last year. It has to do with joint programs. Joint Programs have long been advocated as a means to accomplish great savings in the fielding of some of our major weapons systems.

At first glance, one would conclude, and indeed we went into the study with the perception that there would be considerable savings by developing and using the same or reasonably close approximations of systems to satisfy the military needs of more than one service.

In looking at the joint acquisitions that have been attempted in the past, we looked only at major acquisitions, aircraft and so forth, and we concluded that while the concept is very attractive, there really have not been many success stories.

If one defines success as a fielded major system where (1) the system is reasonably compatible and reasonably similar, (2) the services are happy with its performance, and (3) there have been substantial savings, we did not find any successes.

We recommended as a result of that work that DOD develop some specific criteria for selecting joint programs, and we suggested a number of what we perceived to be fairly stringent criteria or guidelines that we thought might help in identifying potential candidates for joint development and acquisition.

Mr. Chairman, that pretty well summarizes my prepared remarks.

[The prepared statement of Mr. Thurman follows:]

PREPARED STATEMENT OF BILL W. THURMAN, DEPUTY DIRECTOR, NATIONAL SECURITY AND INTERNATIONAL AFFAIRS DIVISION

Mr. Chairman and Members of the Task Force: I am pleased to be here today to discuss the subject of reducing the cost of weapons acquisitions. In announcing these hearings you said you planned to cover a number of issues regarding weapon system acquisition including program stability, reduction of overhead costs, increased productivity, detailed specification of weapon systems, and effective competition.

We agree that these issues should be addressed, and of these issues, program stability may be key.

On balance, the military weapon system acquisition process is characterized by programs which are extended, exceed original cost estimates, and result in fewer units than are originally planned. DOD has attributed most cost growth to: (1) quantity increases necessary to satisfy original objectives or new requirements; and (2) inflation. We do not disagree that these two factors are significant contributors, but would add that overoptimism in cost estimating transcends all the reasons for cost growth.

Realistic cost estimates are essential to maintaining stability in the acquisition process. Overly optimistic estimates of future budgets contributes to: (1) trying to fund too many acquisition programs with the result that too few are produced at the most efficient procurement levels; and (2) continuing lower priority programs on the assumption that adequate future funding will be available.

There are no easy solutions to the problems inherent in the acquisition process. While the problems remain, DOD has and should continue to address them in a systematic manner. DOD initiated its acquisition improvement program in April 1981.

A number of the initiatives associated with this program have been implemented and DOD feels that significant progress has been made. The major remaining initiatives where DOD will focus attention include program stability, realistic budgeting, multiyear procurement, economic production rates, readiness and support, competition, and industrial base. We agree that these are key issues and believe that the initiatives offer sound opportunities for cost reductions overall as well as improvements to the total acquisition process.

While we have not yet made an indepth analysis of the program, in our monitoring efforts we have found that the DOD task force assigned to review the various initiatives have been objective in their evaluations of the progress of the program.

GAO annually reviews selected weapon programs. We also perform reviews and studies which transcend individual programs and focus on system-wide issues which affect the costs of most major acquisitions. Let me briefly mention the former body of work and then elaborate on the latter. Our annual reviews of weapon programs have frequently identified acquisition problems in areas such as:

The ability of systems to meet their performance goals and user needs;

The adequacy of early planning to assure that systems can be supported when fielded;

The sufficiency of systems' reevaluation as the threat changes;

The adequacy of testing and evaluation of developing systems; and

The accuracy and sufficiency of program information provided the Congress by DOD.

As these kinds of issues are identified, we bring them to the attention of DOD management and the Congress for use in the decisionmaking process.

WEAPON SYSTEM COST GROWTH

GAO has done a number of studies on cost growth, cost estimating and DOD's budget projections. The Five-Year Defense Program (FYDP), developed by DOD, provides an estimate of future defense costs related to ongoing and planned defense programs. In recent years, there has been a great deal of controversy over the accuracy of the cost projections in the FYDP.

GAO has studied the historical relationship between the amounts estimated in individual FYDPs and the total obligational authority ultimately appropriated to execute those plans. The analysis shows that the FYDPs since 1963 consistently understated budget requirements for the third, fourth, and fifth years by an average of 14 percent, 26 percent, and 38 percent, respectively. In the case of individual major weapon systems, the Congress has historically granted an average of 32 percent more funds than DOD estimated in its FYDPs. Even with the additional funds, the number of weapon systems which DOD was able to procure was less than programed.

Although it is not certain that the historical pattern of underestimation of funding requirements will continue, there is little evidence of a major change. In executing the fiscal year 1980–84 FYDP, actual appropriated total obligational authority exceeded DOD's original estimate by approximately $246 billion.

DOD has stated that cost planning was often too optimistic in the past and despite efforts to address the problem, it continued to plague the DOD through the late 1970s. DOD now believes it has instituted procedures that will result in more realistic plans in the future.

Future improvements in overall program planning and efficient execution depend heavily on better cost planning. The proof will be in the effect on overall defense program costs and execution. Much will depend on whether the estimates in DOD's 1982 through 1986 FYDPs are in fact more accurate than in the past. If these FYDPs are a reflection of better procurement planning and cost estimating, we should expect the level of total obligational authority required to more closely approximate the FYDP figures as an indicator of progress. A second indicator will be the degree to which defense programs are fulfilled within planning estimates.

The need for reliable cost estimating is greater than ever before. Today's revolution in military technology, the greater complexity of modern weapons, their enormous cost, and their lengthy period of development place an extraordinary premium on sound choices. More than ever before, multi-billion dollar decisions made on the basis of unrealistic estimates could result in unobtainable or unaffordable plans.

IMPROVED PLANNING FOR WEAPON SYSTEMS WHICH ARE TRANSITIONING TO PRODUCTION

For many sophisticated weapon systems, manufacturing the items on time and within cost goals during the early stages of production has proven to be as difficult as developing the weapon. Cost growth and late deliveries have consistently imped-

ed attempts to field new equipment. The additional time and money needed to produce the desired quantities of weapons routinely frustrate planners and contribute to the cost problems just discussed.

GAO reviewed six weapon systems in depth to identify some causes of early production problems and to outline actions which could help minimize their occurrence in future programs. These systems were: Copperhead, Black Hawk, Tomahawk, High Speed Anti-Radiation Missile (HARM), Air-Launched Cruise Missile (ALCM), and F-16.

Copperhead, HARM, Black Hawk, and Tomahawk encountered substantial problems in early production. Their entry into production proved to be much more difficult than anticipated as evidenced by late deliveries, cost increases, and restructured programs. Problems in these weapons' transition to production occurred when production planning and efforts to prove out production processes took a back seat to design and test activities, almost to the point of being completely shut out of the development phase.

The F-16 and the ALCM on the other hand, did not experience as much difficulty as the other systems in the transition to production. In these two programs, a series of production planning actions, including producibility studies, production line and factory layouts, and tooling purchases, were carried out in development, coupled with some demonstration that capabilities and resources needed to begin production were present.

In all six cases, we found the environment which prevailed during the development phase greatly affected how well prepared the weapons were for production, particularly to extent that:

The pressures to achieve technical performance dominated the development phase;

Program management, from both the services and the contractors, demonstrated an appreciation for production preparations and devoted adequate staff to those efforts; and

Funding and quantity stability permitted early and serious consideration of production matters during the development phases.

Recently, DOD has taken an important policy step in the form of two directives. Together, they call for the balanced treatment of production preparations with other technical demands during development, as well as more comprehensive production planning and demonstration efforts in weapon programs. These initiatives are aimed at many of the systemic cause of production problems, and if faithfully implemented shoulds contribute substantially to ameliorating these problems in the future.

Since the culmination of a successful development program is the production and fielding of the weapon system, the efforts undertaken to prepare the weapon for production are a critical responsibility of development. It is through these efforts that production risks can be identified and reduced to acceptable levels before production begins. Overcoming transition to production problems will require DOD to fully fund production preparation even if it means starting fewer programs, and deferring or refusing to produce weapon systems when production capabilities are inadequate or unknown.

MULTIYEAR PROCUREMENT

DOD has pointed to multiyear procurement as a way to significantly reduce the cost of acquiring weapon systems. With the 1982 Defense Authorization Act (Public Law 97-86), DOD received increased multiyear contracting authority, and our work indicates that savings are resulting from multiyear procurement. For example, the multiyear contract for the Army's Black Hawk Helicopter should result in savings of about $37 million.

While we support the multiyear approach, our work has demonstrated the need to carefully review each proposed multiyear procurement on a case-by-case basis. For example, the military services and the Office of the Secretary of Defense reviewed 22 potential multiyear candidates before the fiscal year 1985 budget was submitted to the Congress. On the basis of its review DOD submitted 12 of the candidates for congressional approval.

Multiyear candidates must meet criteria specified in Public Law 97-86 which are designed to balance the benefits and risks associated with the approach. The criteria are that multiyear contracts will benefit the government by saving money and improving contractor productivity, and that the estimated cost and savings are realistic. The criteria also require that the system being procured have a stable design, requirement and funding. In analyzing the 12 fiscal year 1985 candidates, we con-

cluded that 5 did not clearly meet one or more of the criteria, or had undergone enough change to warrant a revised justification.

DUAL SOURCE PROCUREMENT

Dual source procurement has been suggested as a means for attaining additional competition in the acquisition process. Under dual sourcing, contract awards for a product are split between two or more sources, with the larger share usually going to the supplier with the lower price. In the past, the primary objective of dual source procurement has been to assure an adequate industrial base.

Public Law 98-369 authorizes the use of dual sourcing by DOD and civil agencies beginning April 1, 1985, where it would increase or maintain competition and likely result in reduced costs, or where, as under existing law, it would be in specified national defense interests.

We recently completed a review of Army, Navy, and Air Force use of dual source procurement. On the basis of that review, we believe that awarding a larger share of production quantities to low price dual source suppliers can provide an incentive for price competition. However, dual source procurement solely for production price competition can be cost effective only when the product price reduction resulting from competition outweighs all costs to the government for establishing and maintaining the additional source. Therefore, we believe that DOD should carefully analyze the prospective savings prior to using dual sourcing solely for production price competition.

JOINT PROGRAMS

The military services have missions requiring the use of similar aircraft, missiles, vehicles, and other high cost systems. At first glance, it appears that there could be considerable savings by developing and using the same or reasonably common systems to fit the needs more than one service and DOD has made efforts to do this.

We reviewed selected joint acquisitions of major systems—from requirements setting to the verge of production—and concluded that while the concept is attractive, impediments complicate the acquisition process so that, in the final analysis, there have been no real successes. Service differences in doctrine, operations, logistics, and procedures tend to diversify system designs. When joint acquisitions are ordered by the Secretary of Defense or the Congress, the biggest hurdle is getting the services to agree on joint requirements. Each service believes that its concept of a new aircraft, missile, or vehicle will be best for the mission and will oppose compromise of its design or performance goals.

We recommended that DOD develop specific criteria for selecting joint programs and suggested that the following guidelines might help in selecting more promising joint program candidates:

Essential service doctrines will not be unduly compromised.

The programs are not too far down the development road at merger time.

Military effectiveness will not be unduly lessened.

The potential for economies is persuasive.

There is conspicuous support by the Congress, the Office of the Secretary of Defense, the top military officers, and the Joint Chiefs of Staff.

While there are many impediments to overcome in conducting joint programs, the reality is that single-service systems cannot be afforded for every possible use. Joint programs, properly launched and administered, are a way to lessen budget affordability problems and, at the same time, satisfy the needs of more than one user.

Mr. Chairman, that concludes my prepared remarks. We would be happy to respond to any questions.

Senator QUAYLE. Thank you. I thank the witnesses for outlining some of the things that have been done and some of the problems that we confront. I guess the code word from each one of you is to try to achieve that program stability. That seems to be the key. Nobody is against the program stability, and everybody is for it. I think our challenge is, how do we really ensure and enhance the idea of getting program stability.

Mr. Thurman, you talked about three specifics of driving up or having an impact on costs. I think I would like to dwell on some of those, and get a give-and-take discussion going here because cost—

and how we are going to put in strategies to lower the costs in our acquisition cycle—is the reason we are having this hearing.

I can only attest from a congressional point of view that over the past couple of years and, I would say, in the next couple of years, that the issue of cost is going to be one that is going to continue to receive a very high profile.

We certainly want to have the technological capability and superiority, but I think the cost equation is going to be somewhat of an equal factor as far as we go about building our defense establishment.

I would imagine probably 5 or 6 years ago when we talked about cost overruns every once in a while there was really not a great deal of attention focused on cost. It simply was not required. But I can only say that times certainly have changed.

Mr. Thurman, in the changing of the times, you talked about three things that would change the price—quantity increases, inflation, and the third one was overoptimism.

Regarding the inflation factor, it would seem to me that during the mid to late seventies, we certainly were way off base as far as underestimating the rate of inflation. But if you were to go back and take a 3- to 5-year program, you said that is where cost growth really got into it—it is not necessarily the 1 year, but the 3 and 5 years out.

I would imagine that as we put together the budget, particularly in 1982 and 1983, and look at those budgets, projecting 5 years henceforth—I know that in the 1981 budget that the inflation factor would be just the reverse—that it would have been well overestimated.

Therefore, I wonder if GAO goes through and sees part of this unfolding. Are we going to get into a situation where the costs that we have estimated in the past have really been overstated, and that we might in fact find a new phenomenon within the DOD and that these things in the years of 1986, 1987, 1988, with the projections out there, should be coming in well under cost, because the original anticipation of inflation, the deflator factor, was somewhere up around 15, 16, 17 percent.

Even the defense deflator factor is not any higher than 6 or 7 percent now. So there is a potential savings, I guess, of 10 percent. Since this was one of your three elements of driving the cost up and trying to get a hold on how we get the cost and stick to it, I wonder if you have looked at the years out. You might see that this might be a way that we ought to be coming in under costs.

Mr. THURMAN. I think you raise a very interesting observation, Mr. Chairman. In looking at history, what we found was that of the cost increases associated with the 97 weapons systems that we traced over this 20-year period, approximately one-third of that cost growth was attributable to inflation.

But your basic point, I think, is———

Senator QUAYLE. One-third of the growth of the program was attributed to inflation from the original cost etimates?

Mr. THURMAN. Right.

Senator QUAYLE. So now if you had the original cost estimates that were signed on in those years of 1980, 1981, and even 1982, projected 5 years in the future they had to be exceedingly exagger-

ated, not intentionally, but exaggerated, because basically the economic assumptions that we used, including the Congress, were simply way off base.

Mr. THURMAN. That is right.

Senator QUAYLE. Mr. Pyatt, General Randolph, do you want to comment on that point? I think what you are looking at is potentially—and we are going to have to get a handle on this—a lot of potential savings of cost estimates. If things are going to come in above cost, you are certainly going to have to strike from GAO's point of view that second category that has contributed to one-third of the cost growth in the past, and that has been an increase in inflation.

Mr. PYATT. I agree completely. One of the mechanisms that I have noted in our work is that the expectations of inflation have fallen. Inflation has fallen, and expectations for the future are falling, and therefore prices are under control and a fraction of the amount of money that we have not spent on shipbuilding programs has been due to this factor.

Also, not reflected here, but would be reflected in the FYDP, is that the inflation adjustments have fallen in the FYDP, and the amount of defense resources also, so I think your analysis is accurate.

Senator QUAYLE. Has anybody done a cost savings just on the changes in inflation that could possibly lead into these weapons systems programs?

General RANDOLPH. Yes, Mr. Chairman. As you will recall, we are in the process of buying the C-5B. We took a look at the inflation rates that we had negotiated with the contractor when we initially set out to buying that airplane. It turns out because of reductions in inflation we just finished negotiating a reduction in the price of that contract down $439 million because of the downward inflationary trend.

So, your assessment is absolutely correct. we are aware of that, and we are in the process of recognizing those reduced inflationary factors in our contract negotiations.

Senator QUAYLE. But you have not done that on an aggregate basis?

General RANDOLPH. No, sir.

Senator QUAYLE. I imagine it would be somewhat helpful, and I know this question is going to be asked when we get into the budget allocation, whether it is the Armed Services Committee or the Budget Committee, that changes those economic assumptions. Striking the inflation out, which Mr. Thurman said is one-third of the cost growth, we now have a change of direction, and hopefully a change that will result somewhat in at least one-third of the contributing factors.

Now, Mr. Pyatt or General Randolph, would either of you like to add to what Mr. Thurman is saying of the three basic categories, if I am quoting him correctly, that drive up these costs, increase of quantity, inflation, and overoptimism, I think, was the third category? Would anybody like to add or subtract to that?

General RANDOLPH. Let me talk about overoptimism, because that is an area that we, too, in the Air Force have been considerably concerned about. One of the ways that we can try to get cost

credibility, and we are working on getting cost credibility, is in an area we call independent cost assessment.

That is, we get an independent team to take a look at the most likely cost, totally independent from the program office, to try to take a look at all of the factors and determine in as credible a manner as possible what we expect the costs to be, and that is one of the things that we try to factor into our baseline.

Now, to the extent that that independent cost assessment is different from the program office's cost assessment, we then try to reconcile these differences. Why is it different? What assumptions are different? What are the things that would cause one to come up with a different price tag?

And thus far we believe we have been reasonably successful in using that tool to get our arms around the cost realism issue, because the GAO assessment is quite correct. There has been an attempt to do costing in a rather optimistic way, and we just do not think that that type of thing is going to be tolerated any longer.

Senator QUAYLE. General Randolph, when you dispatch your independent team on each of those weapons systems that they have gone in to make their assessment, have they always come back with a lower cost that the system could be done for?

General RANDOLPH. No. In fact I would say probably more often than not the independent assessment is higher than the assessment by the program office.

Senator QUAYLE. Why would that be? Are they just taking losses on these programs?

General RANDOLPH. No, no, the optimism, the independent cost assessment, that optimism that we refer to, those independent costers do not delve into optimism. They look at as realistic factors as they possibly can find, and then project the cost based on realistic factors, and that tends to be a little bit higher than the estimates by the program offices.

Senator QUAYLE. Mr. Thurman and Mr. Pyatt, on these independent teams and independent analysis, do we really have the capability of going in and saying that this weapons system, whatever the case may be, should have been built for *x* amount of dollars? Do we have that kind of capacity to go in with any degree of certainty and make that finding?

Mr. PYATT. Is that question to me?

Senator QUAYLE. Mr. Pyatt or Mr. Thurman.

Mr. PYATT. With certainty, no. The world is full of uncertainty.

Senator QUAYLE. Well, reasonable certainty.

Mr. PYATT. I think there are two mechanisms that are useful. One the general mentioned, should cost. That means we send a team into a manufacturing organization, sometimes assembled within the service, sometimes service and industry go in and look at how things are going, and identify ways other people are doing it for perhaps less money.

A few of those have been done in the Navy, and usually the result has been some cost saving ideas. It is very difficult to do.

Senator QUAYLE. If you have done a "should cost" analysis on most of the weapons systems programs or ships or whatever, have you found a savings?

Mr. PYATT. Usually.

Senator QUAYLE. Usually. You have usually? What is the Air Force's response to that?

General RANDOLPH. Well, Mr. Chairman, let me point out that the should cost analysis is only a part of that. The should cost analysis in that situation, you go through the contractor's production line, how he has got that set up, and you identify inefficiencies, and for those inefficiencies, tell the contractor, "Mr. Contractor, we are not going to pay for that, and you have got to find a more efficient way to do business, and we will give you some suggestions on how you can do that, and that results in a cost savings."

So, yes, sir; should cost usually results in a cost savings.

Senator QUAYLE. But which is the more thorough analysis of what the system ought to cost, the should cost procedure or this independent team that the Air Force—that you have? Which is more comprehensive?

Mr. PYATT. All services have independent cost estimating made on defense programs. Defense also has the review of the independent cost estimate. Those are, by and large, parametric estimates based on history and projected to the system under consideration.

They are a necessary set of aggregations of assumptions. The should cost is a more thorough engineering bottoms-up estimate of the way the process is run and the way it may be run better.

You will also get involved in independent estimates not put together by the parametric method, but put together based upon engineering and cost estimating analysis of the pieces to be accomplished. They are sometimes good and sometimes optimistic. It is a very difficult task.

General RANDOLPH. May I clarify?

Senator QUAYLE. Go ahead.

General RANDOLPH. The should cost is an analysis that is done on a production program after you initiate the production line so the contractor needs to have that line set up, and he needs to be in a position to start production or actually have some low rate production in progress before he can do a should cost.

The independent cost assessment is something that you do right at the beginning of a program, and as the Secretary said, using parametric factors, cost estimating relationships, so in the one case the analysis is really the best estimate based on a situation that exists at the time, and we try to do that as early on in the program as we can, and we continue to update that.

The should cost, on the other hand, is done at the point when we start production, so it is a different tool for a different situation.

Senator QUAYLE. Can we go in and actually point out to the contractor and tell the defense contractor how they can optimize efficiency on their assembly line? Do we have the capacity to say that this change and that change and that change is going to make it more efficient and less costly? Do we have the tools available for us to do that?

You are saying yes, General Randolph?

General RANDOLPH. Absolutely.

Senator QUAYLE. Does the Navy concur with that?

Mr. PYATT. We have it in spotty cases. Sometimes the analysis of what somebody else has done in a similar situation we can transfer

and we have it, and in some cases we have people who have worked enough of them that they really know.

I for one would not assume that the general posture is that in all our lines of business we can go and tell the contractor how best to run his facility, but you can make some generalizations. We in the Navy pushed very hard on the shipbuilding industry to pick up Japanese preoutfitting concepts and apply them in the United States shipbuilding industry. Here was an idea where a concept was applicable. We worked and pushed it. Each industrial activity on its own applied it in its particular case.

The answer to your question depends upon the specific circumstances at hand, from my perspective.

Senator QUAYLE. Let me ask you one more question, and then I will yield to Senator Levin. Mr. Thurman, and I will ask each one of the other witnesses, what I have been trying to grapple with when we go through this procurement cycle and acquisition cycle is at what time in the acquisition cycle, and maybe your question probably leads into some time before they go from full scale development into production, can we or should we be able to get the price and the cost of what this weapons system is going to yield?

Is there an earlier moment with as much certainty? I know there are certain risks in there. At what moment during the acquisition cycle should we be able to and should you go back in and review these cases from an accounting point of view, and you start off from the conceptual stage and then you get into DSARC-1, research and development and full engineering development, and then into the actual development, and sometimes the cycle is as long as, well, the B-1B cycle is going to be, what, 15, 20 years something like that? Some of them are as long as that. Others are shorter. But at what stage, when in that cycle should we be able, with some degree of certainty, to figure out what it is going to cost and be able to have an agreement on that?

Mr. THURMAN. Maybe I can answer that a couple of ways. First, it seems to me that realistically we could begin to look and to hold people accountable at the time a production contract is signed, and you have got the contractor's name on the bottom line saying we will produce for *x* amount of money.

Senator QUAYLE. So that is when they actually go to production?

Mr. THURMAN. That is when we move into the production phase. I guess I would hark back to some of the earlier discussion about our ability to estimate and some of the questions you were raising.

There is no question about it. We are producing some of the most technologically complex devices known to man, and in many cases pushing new technology, and there is no precise, absolutely accurate, way to come up with their cost.

We, too, have seen a pattern that General Randolph referred to where, and I think it is probably reflective of the optimism in the entire system, where the project office's estimates typically are a little rosier than those done by the independent cost estimators, I think that probably is to be expected if you consider the culture that we have in our acquisition process, where people are rewarded for successfully fielding a system on schedule.

I am trying to respond to some of the earlier dialog, too, but on your specific question, I would say that the best number that you

really have is when that initial production contract is signed and you have a commitment from the contractor to deliver at a specific price.

Senater QUAYLE. But you are saying up to that point, until they sign that initial production contract, that any kind of reasonable certainty of what the cost is going to be, that we are in somewhat of a stage of ambiguity? My desire is to be able to—and I know there is a give and take with risk—at the earliest possible stage in that process, to be able to get an agreement and an understanding of what the cost of the weapons system ought to be. My desire is to get that agreement and say, OK, that is it, that is the way it is going to be built, that is the design, that is the production rate, that is the cost, and go forward.

Now, if that has to wait until the production cycle, that is pretty far along in the process. The ideal situation would be if you could get it at the conceptual stage, but I know there are just too many risks in that.

What point in that process?

Mr. THURMAN. Obviously, as you move further through the acquisition process, the certainty becomes greater. However, even once production contracts are signed quite often there are situations where the threat has changed or new technology has come on board, and capability is added to a particular system, which changes its cost.

I did not mean to infer—in fact, I would not argue, that we should not be concerned as early as possible, but I think the reality is that for many of these systems that probably the best that we can do early in the development phase is a range of potential estimates of what the cost will be—a high and a low estimate—scrubbed to assure that we are being as realistic and hardnosed about what we are getting as is possible, given the uncertainties that are associated with many of these systems.

Senator QUAYLE. General Randolph, do you want to add to that?

General RANDOLPH. Yes, Mr. Chairman. With regard to the approach that the Air Force tries to take in getting a handle on what the costs should be for the total program, once we are sure that we are comfortable in the baselining process with the requirements, and everybody has signed off on the requirements, and we do that system definition, about the first time that we have realism, in my view, in the cost process is at the point of critical design review in the full scale development phase.

In the conceptual phase, in my view, there is just absolutely no way for anybody to really come up with a number that has any realism to it at all, and you really need to reach the point where you and the contractor have agreed on what the design is going to be, and that is called the critical design review point.

Once you reach that point, then I think you now are in a position where you have got at least some realism in your costing process. Now the trick is to make sure that the requirements do not continue to creep after that point, that you continue to control those requirements, and that is the thing that we are doing in the baselining process in the Air Force, is controlling the requirements as well as the design of the system to meet those requirements.

Senator QUAYLE. Is that critical design requirement in DSARC-2?

General RANDOLPH. No, sir; the DSARC-2 is the entry into full scale development. The critical design review will run somewhere after that, about a year or two, maybe even as much as 3 years after that point.

Senator QUAYLE. So it is in between DSARC-1 and DSARC-2?

General RANDOLPH. No; it is between DSARC-2 and 3.

Senator QUAYLE. Mr. Pyatt, anything to add to that?

Mr. PYATT. Yes; I think that a service should be willing to sign up with the Congress for a range. I would like to see it in a range—I have been an advocate of ranges for years and never been successful—because I think it is a realistic representation. We should be willing to sign up that this is what we are willing to pay for this development and production program.

Actually knowing what it is going to cost for a particular design or particular configuration, I think, evolves very much along the lines that have been mentioned this morning. We should be willing to take a management action if those projections of cost that developed during the process show that you are outside of your initial representations or else come back and say, here are the reasons we are outside, and do we still have a deal?

I think I agree that it does evolve, but we need to lay it down and get an understanding further on.

Senator QUAYLE. Senator Levin?

Senator LEVIN. Thank you, Mr. Chairman. Congratulations again on your strong effort in this area, your continuing effort.

Mr. Pyatt, on the incentive-type contract, I would like to start by asking you some questions about whether or not it is providing an adequate incentive these days. We had a hearing at Governmental Affairs where the chairman went into some detail on the building of an aircraft carrier where there was an incentive-type contract.

I did not have an opportunity at that time to ask some questions that I would like to ask now. I do not think you were there anyway, but you may be able to give us some information on it.

Are you familiar with the contract with Newport News Shipbuilding of the nuclear aircraft carrier CVN-71?

Mr. PYATT. The *Roosevelt?* Yes.

Senator LEVIN. As I understand it, there was originally an agreement that the carrier would be built over a 89-month period. After the agreement was reached, the Navy agreed—let me go back. That was an incentive type contract.

Mr. PYATT. Yes, that was the first time that we had ever had a carrier under contract with an agreement on duration.

Senator LEVIN. But it was an incentive type contract?

Mr. PYATT. Yes.

Senator LEVIN. And after agreeing to that, and after reaching an incentive type contract with Newport News, Newport News came to the Navy, or vice versa, and it was decided that, gee, maybe they could deliver this thing 14 months earlier, and if so we will pay them an additional $21 million, which was done.

Mr. PYATT. That is right.

Senator LEVIN. So that was a modification of the agreement which said that if you can deliver this vessel 14 months earlier than we agreed to, we will pay you an additional $21.2 million.

My question is, Why wasn't the incentive in that original incentive type contract adequate to give them at Newport News the incentive to bring this cost down and share in the savings? Why did we have to modify the contract?

Mr. PYATT. Well, as I mentioned, when that first contract was awarded, it was awarded over the objections of the administration. It was the first time that the Congress put that ship in. It was the first time that we had ever come to grips with a totally agreed contract on the cost, the duration of construction, and it was the best they would agree to at the time.

Subsequent events in the construction process indicated that it was possible to build the ship faster, to save money for the Navy in the process, and we essentially split the savings.

Senator LEVIN. My question is, Why wasn't the incentive arrangement in that contract adequate to give them the incentive to build it faster because, obviously, they would save money if they built it faster and get to share the savings?

Mr. PYATT. I guess the best answer to your question is, at the time we originally entered into the contract the foresight was not available to reach that conclusion.

Senator LEVIN. I am not talking about foresight. I am saying that as they started to build it and they saw that they could build it, as our consultants told us they could, by the way—the consultants that we had paid for said they could built this in a lot less than 89 months—and then as they started to build it they said, yes, we can build it in less than 89 months, but it is going to cost you $21 million to do it.

My question is, Since they obviously saved money in building it faster because their labor costs were not as great, why was that not enough of an incentive for them to build it without this additional $21.2 million?

Mr. PYATT. Well, the analysts, of at least one of the consultants recommended using the incentive clause to bring it along. Why in the internal thought of Newport News they did not volunteer, I believe, is a good question. I really do not know.

We approached the negotiations looking at here is something better for us. We want to get the ship earlier and to save the money, and we are willing to provide this incentive.

Senator LEVIN. Is it not critical to us to know why our method broke down? If my assumption is correct, and you can check my assumption, that Newport News saved money in building that ship in 75 months over 89 months, if that assumption is correct, then the incentive should have worked without an additional payment of $21 million.

Mr. PYATT. I think what I would like to do and submit for the record if it is OK is a little thought about that mechanism, because we can see it again in other situations.

Senator LEVIN. How common is it that we use the incentive type contract? Is that relatively common?

Mr. PYATT. Well, I am speaking for the Navy. It is a relatively common process in shipbuilding. Almost all contracts or all con-

tracts are incentive in the begining parts of production coming out of development. You will find it in many categories of equipment.

Seantor LEVIN. How about the Air Force?

General RANDOLPH. Yes, sir; in the Air Force it is a relatively common practice. It is used primarily to control costs. That is, to the extent the contractor can save costs, he can share in that savings.

Senator LEVIN. Do you have any idea in what percentage of the cases in the Air Force the contract comes in at or below the target cost on these incentive type contracts?

General RANDOLPH. I don't have a percentage, but I can give you some examples.

Senator LEVIN. No, I don't want examples. Is it usual that they come in below target cost? It is more often than not that they come in below target cost? Can you give us any assessment?

General RANDOLPH. I would have to say that probably the experience is that they would tend to come in above target costs. However, by virture of having a fixed price incentive with a ceiling, the basic position that we have as far as the Government is concerned is, if the contractor continues to increase up to that ceiling, we basically have a firm fixed price contract.

Senator LEVIN. I understand. Nonetheless, you believe that more often than not it comes in above the target price, correct?

General RANDOLPH. No, sir; the target cost.

Senator LEVIN. More often than not the contracts come in above the target cost?

General RANDOLPH. Yes, sir.

Senator LEVIN. How about the Navy?

Mr. PYATT. I don't have a firm collection of overall statistics, but I think it also depends on the share line. Past impressions indicate that if the share line has the Government sharing the larger portion of cost overrun or gaining a larger portion of underrun, they tend to come in above cost.

As you steepen the share line, which we try to do, you may get more, but you also pay more. You tend to come in much closer and below.

Senator LEVIN. In either case, though, can you tell us whether it is more often than not that they come in above target cost on these incentive type contracts in the Navy?

Mr. PYATT. I would guess that they tend to come in above target cost slightly. It is really a judgment based on some samplings, and I tend to sample the ones that are in trouble, so it is hard to give you an overall answer.

Senator LEVIN. Well, Mr. Chairman, yesterday in thinking about the hearing today, we made some inquiries the last couple of days, I guess, about statistics, and it is kind of a fascinating question. We have got this incentive type arrangement that is supposed to give incentive to people to come in below target cost.

It is the whole purpose of it, and yet we cannot find out any statistics on this as to whether it works more often than not, and again, as it might relate to the share line, as to whether it works more often than not. So we have asked the GAO to do a study, Mr. Chairman, and I think maybe if this committee can get its muscle behind the request, we might get a speedier answer.

Not that they are not doing things as quickly as they can, but if the committee could support this request of mine for this analysis, I think it would give it higher priority at the GAO. It is a very important question.

Mr. Pyatt this morning has said that maybe we ought to change the share line. I happen to agree with you. Or at least look at it. We do not have any history of these incentive type contracts. I could not tell you, at least from our quick analysis in talking to the three services, I cannot tell you whether these incentive type contracts work 10 percent of the time, 50 percent of the time, or any percent of the time.

So, if we are able as a committee to give some support to that request for a GAO study, I think it might give us some quicker response.

Senator QUAYLE. I think your point is well taken. We need to have a handle on what is working and what is not working. I understand that in a firm fixed price or with an incentive contract that the percentage below the line, in other words if they come in under, is, 50–50? It depends on the share line, but is it the same below the line as above it?

General RANDOLPH. No, sir; it changes. It is a matter of a particular type contract. But, sir, let me just talk a little bit about fixed price incentives.

Senator LEVIN. If you do not mind, you can supply it for the record, because I just have a few more questions, and I have taken more than my time.

[The information follows:]

FIXED PRICE INCENTIVES

The following is provided as additional background on fixed-price-incentive, firm target (FPIF) contracts.

Contracts reflect, in a concrete way, the balance of risk versus reward which exists in the Government business environment. In the most simple contract type, firm-fixed-price (FFP), virtually all risk of performance falls onto the contractor; should the contractor fail to accomplish the required work effort at a cost less than the contract price, the contractor suffers a loss. This contract type works well in the procurement of goods and services for which requirements can be described clearly and definitively.

Much Government contracting involves, by necessity, situations where such clear and definitive descriptions of work cannot be accomplished. The risk to contractors and the Government under such situations may be very great when FFP contracts are used. Under FFP contracts, the reaction by contractors to such risk is reflected by contractor "contingency" pricing, where worst-possible-case analysis is accomplished and the contractor's price is inflated to cover such contingencies. This can result in the government paying very large "windfall" profits to contractors, when contingencies do not materialize; it can also result in very large losses to contractors who do not fully anticipate contingencies which occur during performance.

In order to address these high risk situations, various contract types have been developed which apportion risk according to preestablished formulas designed to incentivize efficient performance. There are several such contract types which may be used according to the degree of risk present in the contracting situation. The FPIF contract is one of these.

The components of an FPIF contract are target cost, target profit, target price, ceiling price, and share arrangement. For example:

Target cost	$10,000,000
Target profit	$850,000
Target price	$10,850,000
Price ceiling	$11,500,000
Share	70/30

Under this example, when the contractor experiences costs of $10,000,000, the profit would be $850,000 for a total price to the Government of $10,850,000. Overruns/underruns are "shared" by the parties, with the Government sharing at the rate of 70% and the contractor at the rate of 30%. Thus, if the contractor "underruns" costs by one dollar, contractor profit is increased by thirty cents while overall cost to the Government is reduced by seventy cents, and vice-versa for "overruns." This sharing continues to the price ceiling where the contract converts to a firm-fixed-price format and the contractor absorbs all cost risk beyond that point.

There is, of course, no way to anticipate the "trade-offs" accomplished internally by a contractor in response to the business environment peculiar to a given firm. To that extent, the use of an FPIF contract may incentivize contractors in a less than perfect manner. In such a high risk environment, however, the alternatives are usually cost reimbursement contracts, which contain even less incentive to control costs, or FFP contracts which cannot be used for reasons already discussed.

What forces operate to prevent contractors from defeating the incentive aspects of the FPIF contract type? There are several. First, there is the force of competition in contract award. Contractors who are experiencing the fixed-cost pressures of salaries and overhead from underutilized employees and facilities will find successful competition against more efficient producers very difficult. Second, since the allocation of overhead costs to a contract is reflective of the value of that contract relative to the total value of all contracts possessed by the contractor, the ability of a single contract to significantly absorb such costs is severely limited. Third, costs allocated to contracts must meet the criterion of "reasonableness," which is defined by FAR as, ". . . that which would be incurred by a prudent person in the conduct of competitive business." To the extent a contractor attempts to inflate gross proceeds through the incurrence of unproductive costs, that contractor runs the risk of having such costs declared unallowable by the government. Finally, as part of a source selection authority's decision process, an integrated assessment is accomplished of each offeror's ability to satisfy solicitation requirements. Per Air Force Regulation 70-15, "Source Selection Policy and Procedures," one of the general considerations included in this integrated assessment is a contractor's past performance. Contractors with a history of poor cost control practices run the risk of not being selected for future contract awards.

Senator QUAYLE. Go ahead, Senator Levin.

Senator LEVIN. Could I just ask a few more questions? Let me just say on this subject, if I were in business, and I had a fixed-price incentive contract, I am not the least bit sure that that incentive would give me much of an incentive to go below the target cost.

I may want to go right up to that ceiling in order to pay my salaries, my executives, in order to pay my fixed costs, in order to stretch out the project so I can smooth out my operations. I am not sure that that incentive is really much of an incentive at all. I think we may be kidding outselves.

I think we may be entering into a fixed cost—excuse me, a fixed-price incentive contract where we have target costs, thinking that, by God, you are going to make that target cost because we really have an incentive in there, but in fact building in a 10-, 20-, 30-percent cushion, where I think many business people from a good business perspective would have very little incentive to meet that target cost.

Now, that is my hunch, looking at it, as I think I would, as a business person, depending on the share line. A lot will depend on that share line. My hunch is that I would just as soon have a little less profit, you know, a little less profit, maybe, but a lot more gross coming in, paying my salaries, paying my overhead, and all the rest.

Now, that is what I would like to get at with this study.

General RANDOLPH. Sir, the whole question of whether you go firm fixed price or fixed-price incentive is a question of risk man-

agement. If you tell a contractor, a contractor that has some risk, that he has to go firm fixed price, his bid will take care of that risk, and he will bid to the point that he feels that he is comfortable in handling that risk himself.

In the case of fixed-price incentive, there is a sharing of the risk, and that is the whole purpose of the incentive, the difference being that if you go firm fixed price you will with certainty go to the ceiling, because it is firm fixed price, and that is what he is going to bid. If you go fixed-price incentive, you have a probability that you will have the opportunity.

Senator LEVIN. I understand. Target cost, as I understand the definition of target cost, that is supposed to be our estimate or our agreed-upon estimate of what that thing should cost.

General RANDOLPH. The cost. Not the price, now, the cost.

Senator LEVIN. That we add a profit to. But that is what we estimate is the cost, and yet if it goes above our honest estimate and theirs that we have agreed on, we are still going to pay a significant part of that increase, depending on the share line.

General RANDOLPH. Yes, sir.

Senator LEVIN. So that we say this thing is going to cost $10 million, we will give you $1 million profit, but if it goes to $11 million cost, we are still going to give you a good portion of that.

General RANDOLPH. No, sir.

Senator LEVIN. Yes, we will, if that is our ceiling. If the $11 million is the ceiling——

General RANDOLPH. We will pay them $11 million.

Senator LEVIN. No, we will pay them $11 million plus a portion of the profit, depending on the share line.

General RANDOLPH. No, sir, $11 million ceiling, that is all you pay.

Senator LEVIN. Let me go back to my figures. We have a $9 million target cost. OK? And I may have confused you because I have 2 million in there. We have a $1 million profit. We have a ceiling, let's assume, a ceiling of $11 million. Let us do it that way.

Now, if they go above the $9 million target cost, we are going to pay up to $11 million anyway, right?

General RANDOLPH. Potentially.

Senator LEVIN. Or part of it, depending on the share line. All I am saying is that for managing a business, you may be far better off getting a bigger gross and a smaller profit, which is what we tolerate with these ceilings and target costs. That is all I am saying.

General RANDOLPH. Yes, sir.

Senator LEVIN. It seems obvious to me that that would be true.

General RANDOLPH. But he is losing profit as he eats it up.

Senator LEVIN. He is losing some of his profits. Of course. That is the whole point of this. But he is gaining payment of his salaries, payment of his overhead, and keeping his operation going until maybe there is a new contract coming in. That is a big gain if you are in business.

If you asked me if I would rather have $1 million in profit or $700,000 in profit, I'd say I would rather have $1 million profit. I say not necessarily.

That may sound absurd, but I say not necessarily because if I could gross $20 million with a $700,000 profit or $18 million with a $1 million profit, I may go for the $20 million gross, because I have paid a lot of executives' salaries, because I have paid a lot of overhead, because I have paid a lot of other things which I have to pay for.

General RANDOLPH. You are simply saying survivial and share of the market is as important as profit, and we recognize that.

Senator LEVIN. I am saying it is important. I am not saying it is as important.

Mr. PYATT. May I add one on your question? I would simply say you are right, and that is called riding the share line.

Senator LEVIN. That is right.

Mr. PYATT. And it is a boobytrap of doing business in our world.

Senator LEVIN. Of doing business where?

Mr. PYATT. Of doing business in the world of having to share risk and not being able to write everything fixed price.

Mr. THURMAN. If I could, I would just like to echo that. I think the scenario you outline could certainly come to pass, depending on the circumstances of a particular business that we are dealing with. I also wanted to assure you, Senator Levin, that we will take expeditious action to undertake the study you requested.

I have not seen your letter yet. But we will give it prompt attention.

Senator LEVIN. I didn't mean to suggest that you would be other than as speedy as possible just based on individual Senators' questions. Sometimes when there is a committee or subcommittee in support of it, it speeds things up, and I understand that. You have got a lot of things to do. I have some questions I would like to ask for the record.

Senator QUAYLE. Without objection, those questions will be submitted for the record.

I want to go back to this idea of figuring out, whether it is should-costs or independent-cost analysis on how we are going to figure out what a system is going to cost. I am intrigued by this, because I get the distinct impression that you are fairly confident that you can do this. You can go in and you can figure out what it actually should cost and make a determination of what this weapons system ought to cost.

If that is the case, and you have this independent capability to do that, it seems to me that we would just go out, and I am not so sure that the need for dual sourcing or competition or anything else would be that necessary. We could just figure out what this price is and say that is what you are going to build the ship for, or the plane for, or the missile for, and we are not going to pay any more because we know the costs.

Now, am I getting the right perception there?

General RANDOLPH. Sir, it is important to understand that this works, but under some very restrictive set of circumstances, and the restrictive set of circumstances is, first of all, any should-cost action is a very very people-intensive process.

It takes a long time. It takes a lot of skilled people. And while we certainly have those skilled people, we do not have them in large numbers. They are few and far between. There are enough to be

able to do these, but to do them on a very careful and restricted basis.

Second, the should-cost process only really works after the production line is set up. It is clear what the contractor's price is. He is working that process. Then you can look at that process and identify those inefficiencies and those things that he is doing that you think we would recommend improvements and areas where we definitely believe we can save money.

Senator QUAYLE. So in other words this is somewhat going back and having your reviewer Monday morning quarterbacking and saying, well, if we had done this, we could have saved this much money, and therefore you can probably do this in the next system.

We are not talking from the starting point saying we know for certain that it is going to cost this much, and that is where you get into the strategy. To me it seems you have to get more competition. You have more dual sourcing, because we don't really know those costs.

General RANDOLPH. Absolutely.

Senator QUAYLE. We really do not know what those costs are going to be, and the best way to get a handle on those costs is to have more competition or have at least the threat of competition and dual sourcing. Is that thinking correct?

You are nodding your head yes, General. Mr. Pyatt, do you think so?

Mr. PYATT. I think it is correct that we sure have a rough time selling dual sourcing programs on the Hill and in the Pentagon. Let me kind of outline the debate we get into, and I will close with a specific example.

The general theory says that if we really know what a program is costing at a place, there are no benefits going to accrue from competition. I have heard this statement so many times, it is incredible. They tend to——

Senator QUAYLE. That is the discussion we just had. If we could get that degree of certainty of what it is going to cost in the front end, why have competition? Just say you are going to build it for that much. But you cannot.

Mr. PYATT. It is amazing how many times people walk into a discussion with that assumption. Then we are in the position of having to sell, let us say, some analysis that we went through showing that we think competition is likely to pay off.

And there is limited data to work with, particularly—most of it is in the missile business, and there is some in shipbuilding now, but the classical analysis would generally show a very long payoff period, or maybe not at all, depending on assumptions made on what happens in the learning curve, how much startup costs are involved.

My experience is that we simply do not know how to do the analysis. There has been one interesting set of work done by one of the analysis firms here in town that begins to put out the concept of once competition starts, there is a drop in price that occurs.

We saw that when we go into the HARM second sourcing issue. We made a lot of money just fighting about it, and that was time well spent, even though it did not come out the right way as far as

I am concerned. It happens invairably. There is nothing that a business manager fears more than losing business.

This goes along the line of Senator Levin's question. How do I carry on my operation? How do I ride the share line? If he is really concerned, his most fundamental concern is not having that order on the books or the potential of losing it.

The view of most industrialists is that competition is wonderful as long as it happens to somebody else, I run into that view many, many times. Let me talk about a specific case of analysis that dealt with the CG-47 second sourcing of the ship portion, not the electronic, the ship portion.

Analysis showed that in making that decision, it would cost us something like $400 million above the current plan. The actual results are, we saved $700 million. The difference is $1.1 billion, or about 30 percent of the total if we had paid attention to the analysis. It happens time and time again.

We simply do not know how to do the analysis. What gets presented as facts are not facts; are not the facts that I believe will evolve, and then we get accused of being blind optimists and in favor of competition. I am in that category. But it works. But it is a very, very hard proposition to sell.

Here in the Pentagon, in the service it is a fact of life. It is fun selling but it is hard to sell.

Senator QUAYLE. Do you agree with that assessment, Mr. Thurman, that there are real savings in competition and dual sourcing in particular, or are there some other problems that we ought to consider? That is, a fairly strong positive statement that we ought to be going in this direction and doing it as much as possible.

Senator THURMAN. I wish I had a definite answer for you on that question, Mr. Chairman. We have seen aspects of the Assistant Secretary's analysis.

I think one of the difficulties that he was probably referring to in selling dual sourcing is the startup cost and the maintenance cost of developing a new supplier and trying to make a reasonable estimate of whether or not in fact the resulting downward trends in prices will cover the cost of that investment cost.

The one thing—excuse me.

Senator QUAYLE. Go ahead.

Mr. THURMAN. In the work that I have mentioned that we performed in the dual source arena, I think it is important to recognize what we found was that dual sourcing in the past has largely been used as a means to assure an adequate industrial base and an adequate industrial capability as opposed to a competitive cost saving kind of thing.

Now, that changed with the advent of the recent legislation. Effective April 1 there is clear authority for the use of dual sourcing as a competitive device as well as to ensure an adequate industrial base.

What we found—this is a long way of getting to my point—when we took a look at the cases involved in dual sourcing in the past, was a paucity of cost-benefit analyses, because cost savings was not the primary thrust or the primary objective of the dual sourcing.

But we did observe, as I mentioned earlier, in about half of the cases the kind of outcome that the Secretary just referred to was in

fact taking place. Prices were coming down. The second source supplier was able to deliver items at a cost which was competitive with or less than the original supplier.

That is a long answer.

Senator QUAYLE. In your reviews of DOD, has there ever been an example where the second sourcing has cost us more money in the long run than what we originally anticipated?

General RANDOLPH. Yes.

Senator QUAYLE. The Air Force has an example?

General RANDOLPH. Yes, there are cases.

Senator QUAYLE. Ones that you have gone with second sourcing?

General RANDOLPH. There are cases where in order to get a second source you have to enter into some kind of a licensing agreement whereby the primary source through some agreement gets a licensing fee to allow the second source to produce.

Then the tendency is that you probably will not save money in that kind of an arrangement. Now, we in the Air Force don't like licensing agreements, and in fact we tend not to get into those.

Senator QUAYLE. Have you got a second source example where you have contracted for a second source, gone through with the second source, and in the long run you have lost money, or it has cost you more money?

General RANDOLPH. No.

Senator QUAYLE. You have not?

General RANDOLPH. We would not enter into that.

Senator QUAYLE. I know there are some theoretical possibilities. I mean, depending on the cycle, too. You may be at the very end of the cycle and something was already there. You certainly are not going to second source that. It would not make a lot of sense.

But I am talking about cases where you actually have a second source situation. Are there any cases where it has in the long run cost you more money?

General RANDOLPH. If you enter into that deal——

Senator QUAYLE. Are there cases where you have gone into second sourcing and it has cost you more money?

General RANDOLPH. Mr. Chairman, the point I am mentioning is that you would not do that without a reason, and the reason, the only reason that I can think of would be to increase the business base, to make sure that there is sufficient production capacity or capability in the industry to produce so that you may eventually have either benefits by virtue of the fact that you could have more people who could produce that item, and it may lead to future competition.

If for those reasons you want to invest money, you may well with your eyes wide open enter into a second sourcing whereby you are not really saving money.

Senator QUAYLE. But in the cases that you have had dual sourcing, the bottom line has been that you have actually saved money. Is that correct?

General RANDOLPH. In the main, that is true.

Senator QUAYLE. Mr. Thurman is shaking his head.

Mr. THURMAN. Well, Mr. Chairman, in all fairness, I am uncertain and unable to answer your question factually.

Senator QUAYLE. Maybe you could give us an answer for the record. I think that is an important question. In places where we have actually gone forward on a second source, dual sourcing, what has been the net result? And if the net result in every case is that you actually have saved money, then obviously we ought to have more dual sourcing. If you have more dual sourcing and more competition, invariably you are going to have a lower cost. I think this is the direction we ought to go.

General RANDOLPH. Sir, my only caution is the absolutes, where it is always going to be that way. Our experience is—I have just got a few here.

There is a cluster bomb unit which is part of the Combined Effects Munitions Program, had a leader-follower approach whereby that was a second source. We may buy up to 150,000 units and our projected savings will be $35 million in 1988 and $89 million in 1989 and a 20-percent savings over the out years.

The ground wave emergency network we are also using a leader-follower approach with a projected savings.

Second sourcing is being pursued in the Peacekeeper Program to minimize technical, manufacturing, and schedule risks. A net savings of about $200 million is estimated in that case.

In the case of the IR Maverick, total program estimate of $5.6 billion, we will have a net projected savings of about $300 million because of second sourcing.

So, the point is, we believe that second sourcing does indeed lead to a more competitive environment, and leads to potential savings. I must caution about absolutes—that it will always happen that way—it is not necessarily so.

Senator QUAYLE. Does anybody have anything to add to that?

Mr. PYATT. We focused on cost in this discussion. I think we left out a couple of other very significant parameters.

One is in the Sparrow Program. We had cost competition, a very effective cost competition, but we also had times with the two manufacturers where one manufacturer could not produce a satisfactory weapon, and the other continued, and that happened to each producer at different times. We in fact maintained and protected the mobilization base of the country.

The other thing that occurs is, under the pressures of competition, technological innovation occurs on the manufacturing floor, in the heads of the engineers doing things, because everybody is kind of always scratching for that little thing that puts me ahead of the other guy.

That is to our benefit. So I hate to see these discussions solely focused on cost.

On your first question, I was sitting here trying to think of cases that I know about. I do not know of a case where we have failed to save money. And the most likely possibility is, where production was truncated beyond initial expectations and you lost on the market.

I do not even know of that case, but that is where I would look.

Senator QUAYLE. OK. I have some other questions I will submit for the record, but I want to thank each of our witnesses very much. This probably will be the first in a number of hearings, and I look forward to further communication and mutual cooperation

from both sides to get an understanding of this issue, so that it will hopefully produce a more efficient system than we have now.

[Questions with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR DAN QUAYLE

FIRM FIXED PRICE CONTRACTS

Senator QUAYLE. It is my impression that part of the Navy acquistion strategy in purchasing items other than ships has been to get into a firm fixed price mode as soon as possible. Is this really a sound acquisition approach?

Mr. PYATT. Awarding a firm fixed price contract should be the policy objective in programs where (1) there is a reasonable degree of design stability; (2) production techniques are in place; (3) cost and pricing data and history are reasonably available; and (4) both parties can evaluate the degree to which risk is or is not present. The sooner we move to this more advanced type contract the better we, in Navy, like it. It is a sound acquisition approach.

FIRM FIXED PRICE VERSUS INCENTIVE

Senator QUAYLE. Why does the Navy think it does better under a firm fixed price contract than under a fixed price incentive type contract?

Mr. PYATT. I cannot say that we would do better each and every time under a firm fixed price contract.

Where the conditions are present for firm fixed price, and we can assure ourselves that there are no contingencies for unforeseen or unplanned risk included in the price, then we expect to do better under firm fixed price than fixed price incentive. In a firm fixed price environment, all overruns are at the expense of the contractor and underruns are profit. This is not the case with fixed price incentive where we share costs over target and share savings when the target is underrun.

PRODUCTION COSTS

Senator QUAYLE. Mr. Pyatt, once a military requirement is established, will the cost of manufacturing that weapon system vary greatly with different designs?

Mr. PYATT. Yes. Our problem is to find the lowest cost solution.

Senator QUAYLE. Do we encourage contractors to design to minimize production costs? It seems like we may be placing far more emphasis on technical superiority than on low cost producibility.

Mr. PYATT. The acquisition system tends to place more emphasis on technical issues than cost control. After all, the first priority of a development is to get something that works. The managerial problem is to assure that the right balance occurs and unnecessarily demanding technical constraints are not imposed.

MANUFACTURING COSTS

Senator QUAYLE. Let me ask you the same question General Randolph. Once a military requirement is established, will the cost of manufacturing that weapon system vary greatly with different designs? Do we encourage contractors to design to minimize production costs? It seems like we may be placing far more emphasis on technical superiority than on low cost producibility.

General RANDOLPH. Design can have significant impact on production costs; to minimize these costs, we utilize productivity enhancement programs. Productivity enhancement within AFSC starts early in the systems acquisition process. Our policy requires that, from the outset, we consider productivity enhancement when developing contract strategy, seeking ways to motivate contractors to become more efficient in their manufacturing operations and using contract incentives to encourage contractors to invest in cost-effective manufacturing technology. Further, contractors are encouraged to make capital investments by credit given during source selection to contractors who are making productivity enhancement efforts, including the use of advanced manufacturing technologies. This policy also requires the development and maintenance of a producibility engineering and planning (PEP) program throughout systems acquisition. This policy requires the maintenance of effective interface between design and manufacturing engineering, and enables the results of producibility analyses to be incorporated in designs.

This policy also requires a work measurement system applying MIL-STD-1567 to certain programs. Work measurement increases contractor manufacturing efficiency through the development of "standard hours." Standard hours, computed by objec-

tive engineering analysis of the work effort involved in manufacturing, provide a standard against which actual performance can be compared. This technique enables contractors and the Government to pinpoint inefficient activities and processes, subjecting them to management security and correction.

Our policy on manufacturing risk identification and reduction requires continual assessment of manufacturing risk throughout systems acquisition. Early in the acquisition process, a manufacturing strategy plan is accomplished, which develops estimates of production costs and schedule data for each manufacturing alternative. During the concept exploration phase, manufacturing feasibility assessments (MFAs) are accomplished for each competing alternative; this feasibility is reassessed during the demonstration and validation phase.

In addition, we perform Production Readiness Reviews (PRRs) on major acquisitions during the full scale development phase. This review analyzes proposed designs to ensure they are producible, that the contractor's production plan is satisfactory, that the contractor's manufacturing methods, quality assurance controls, resources (including facilities, equipment and personnel) and controls over subcontractors are adequate and ensure cost effective production.

The success of these AFSC policies was recently addressed by the General Accounting Office (GAO) in its report, "Preparing Weapon Systems for Production: Can We Afford Not To Do It?" (951718). The report reviewed six weapon systems in depth to illuminate causes of production problems. The two Air Force programs reviewed (F-16 and ALCM) were characterized as possessing development that "* * * enabled a more balanced treatment of near-term technical concerns and long-term production concerns * * * moreover in these two programs, production readiness reviews * * * were held periodically to help manage production preparations. * * *" The recommendations from GAO were clearly supportive of the AFSC approach to using production readiness data.

OVERSPECIFICATION OF WEAPON SYSTEMS

Senator QUAYLE. Mr. Pyatt and General Randolph, the Deputy Secretary of Defense recently issued guidance on overspecification of weapon systems. Could you explain how you interpret that guidance and what concrete steps your service will take to implement the guidance.

Mr. PYATT. Our interpretation of Deputy Secretary Taft's guidance is simple—we must rid ourselves of overspecification that leads to unnecessarily inflated costs of acquisition. We have already taken steps to implement the guidance.

The Secretary of the Navy has appointed a senior official to oversee review and reduction of Navy specifications. This individual will be responsible for work that will proceed at all levels of the Navy to review item prices and specifications and reduce or eliminate unnecessary specifications.

Our initial project is called SPEAR—Specification Evaluation and Review. Under this project, Tiger Teams will screen our inventories to target specific items for specification review. The appropriate Systems Commands will review the specifications for targeted items to update, reduce, or cancel the specification, as necessary. Existing specification review programs, such as the Naval Sea System Command Specification Improvement Program, will be given more emphasis and item reviews will be accelerated.

As we move further into implementation of the Deputy Secretary's guidance, other initiatives will be developed and implemented to ensure that problems of overspecification are solved.

General RANDOLPH. DEPSECDEF recently issued guidance (Memorandum dated 4 Dec 84) to the services on reducing over-specified and non-cost effective acquisition requirements. HQ AFSC has interpreted this memorandum to mean that we are to conduct an extensive review of all related acquisition guidance and practices to ensure all non-cost effective and over-specified requirements are eliminated. We have several on-going and planned improvements to implement these actions. For example, in 1976, aeronautical Systems Division initiated an extensive overhaul of specifications and standards. This effort, entitled MIL-PRIME, will result in a set of 53 basic specifications which are based on performance requirements rather than "design-to" requirements. Another product division, electronic Systems Division, has implemented a computerized system to prepare contract statements of work and contract data requirements which tailor the specifications and standards for the program office. In addition, AFSC policies are being revised to provide specific instructions on tailoring contract requirements, and action been initiated to include more specific direction on cost-benefit analysis and affordability considerations. In

sum, we have taken concrete steps over the last several years to reduce overspecification of weapon systems and will continue to do so in the future.

BUYING OF NAVAL AIRCRAFT

Senator QUAYLE. Mr. Pyatt, why are we buying a number of naval aircraft—A-6, EA-6, E-2C, SH-2F—at a rate of six per year? Is this an economic rate at which to buy these aircraft,

Mr. PYATT. Annual procurements of these aircraft are determined by the number needed to replace those that are retired annually due to overage or to attrition; and we do attempt to minimize the problem by rationally time-phasing the introduction of follow-on aircraft. In the case of the A-6, for example, the small quantity being procured (an attrition buy) permits the maintenance of the production line while preparing to introduce an A-6E upgrade. The substantial cost of closing down a production line only to re-open it at a later date will not be incurred.

However, I would like to point out that the A-6 and EA-6 are not separate production lines. Along with EA-6B and A-6E production there are concurrent modifications to older EA-6 and A-6E's in same area of production. Thus, we have taken advantage of line efficiencies that would otherwise be gained by higher production rates of the individual aircraft. Similarly, E-2C and C-2 are produced in conjunction with each other to produce the same effect. The overall impact is production facilities that are running at efficient rates.

QUESTIONS SUBMITTED BY SENATOR CARL LEVIN

MULTIYEAR SAVINGS

Senator LEVIN. Mr. Pyatt, what type of savings should we expect from a 3-year multiyear buy? Can we not do better than savings of 10%?

Mr. PYATT. I expect at least 10% savings excluding the impact of inflation avoidance. Our experience to date with multiyear is:

[In percent]

Program	Projected savings	Current estimate or actual savings
C-2A	7.8	13.3
MK-46 Torpedo	5.5	15.3
NATO SEASPARROW Ordalt Kits	29.6	33.0
MK-45	13.8	22.6
TB-16 Towed Array	14.4	[1] 14.4
C/MH-53E	14.4	[1] 14.0
AN/SSQ-36 Sonobuoy	12.9	[1] 12.9

[1] Estimate

Multiyear is a very valuable management tool which can save considerable sums when applied to the right projects.

SHOULD MOST SYSTEMS BE MULTIYEAR

Senator LEVIN. Do you see any reason why most weapon systems should not be procured on a multiyear basis?

Mr. PYATT. I believe that more of our weapon systems can be procured on a multiyear basis. In many Navy weapon systems, the designs have been stabilized to a sufficient degree to allow the pricing of three or four years of production. Although we started with a low success rate in getting programs approved in Congress, the trend has improved and both programs proposed in fiscal year 1985 were approved.

SAVINGS ON 3-YEAR MULTIYEAR BUY

Senator LEVIN. General Randolph, what type of savings should we expect from a 3-year multiyear buy? Can we do better than savings 10 percent?

General RANDOLPH. The number of production "buy-years" to be included in a multiyear contract is not, by itself, a determinant of multiyear savings. The number of years covered by the contract is only one variable which affects the quantity and percentage of savings. The total number of units included, the amount of available production capacity (prime contractor and his subcontractors) and the nature of the product itself are variables which we believe are of more importance than number of "buy-years" involved. To date, the Air Force has had only one multiyear contract which spanned three production years. Other Air Force multiyear contracts have included four or more years. The program that covered three years was the Defense Meteorological Satellite Program which had estimated savings of $58 million or 19%. In this case, we believe that the three year span was incidental to the savings achieved.

The kind of diverse factors discussed above also combine to determine what percentage of savings will be achieved. There is nothing critical about the savings percentage on a project. The Air Force would oppose any attempt to make a multiyear candidate achieve a threshold percentage to qualify as a viable project. We believe that the Congress and the Administration should pursue any project which meets the multiyear selection criteria and provides a reasonable benefit to the Government. This allows decision makers within the Services, the Administration and the Congress to judge the individual merits of each project without having their flexibility limited by arbitrary rules. Within Air Force experience, savings in excess of $690 million would have been lost if we had arbitrarily established 10% savings as a mandatory threshold.

WEAPONS SYSTEM ON MULTIYEAR BUY

Senator LEVIN. Do you see any reason why most weapon systems should not be procured on a multiyear basis?

General RANDOLPH. The six multiyear selection criteria which have been jointly adopted by the Congress and the Department of Defense have served us well in allowing for the selection of only the best candidates. Some weapon system procurements are never able to meet all six criteria and thus are never suitable multiyear candidates. However, the Air Force believes that all production programs should be screened for potential multiyear suitability and is taking steps to direct all program managers to carefully measure their program against the criteria. This screening will apply to all procurements regardless of size or type of commodity. Those candidates which meet the criteria will be aggressively pursued by the Air Force for conversion to a multiyear strategy.

INCREASING FORMAL ADVERTISING

Senator LEVIN. Mr. Pyatt and General Randolph, Senator Grassley in the last Congress proposed legislation to require DOD to increase formally advertised procurements by five percent a year until seventy percent of all DOD purchases were formally advertised. The New York Times has editorially endorsed this proposal.

It is my impression that it would be virtually impossible to do this, since we cannot procure major weapon systems, at least initially, by formal advertising. Do you agree with me, and what is your view on the so-called creeping capitalism bill?

Mr. PYATT. Acquiring all or even a substantial number of major weapons systems using formal advertising/sealed bidding is a practical impossibility. In order to use sealed bidding the Government must be able to meet four criteria. Award must be able to be made solely on the basis of price and price related factors. No discussions can be held with any of the offerors for such purposes as clarification of their offers. There must be a reasonable expectation of receiving more than one sealed bid. There must be enough time for solicitation, submission and evaluation of sealed bids. In the great majority of major weapon system procurements the use of sealed bidding is not appropriate as these criteria are not met.

CICA represents the proper approach to competition. The Act recognizes that the method of procurement (sealed bidding, competitive proposals, etc.) is not the proper focus. The proper approach is to maximize the opportunities for industry to compete rather than concentrate on the method used. To this end, CICA amended our basic procurement statutes to set forth full-and-open competition as the requirement rather than formal advertising/sealed bidding. CICA enables us to use the method most appropriate to the circumstances whether that is competitive proposals, sealed bidding or a combination of competitive procedures. The emphasis is on providing for competitive, not on the method used. We strongly support the thrust of CICA

and are institutionalizing competition within the Navy by making competition a keystone in our business activity.

General RANDOLPH. The Air Force is in complete agreement with your statement that it would be virtually impossible to increase formally advertised procurements by five percent a year until 70 percent of all DOD purchases were formally advertised. We cannot procure major weapon systems, which account for a significant proportion of total Air Force procurement dollars, by formal advertising. Formal advertising is a very rigid contracting method which requires precise specifications, terms and conditions which permit award solely on the basis of price. Such a method is not appropriate for procurements of complex, or new and evolving products or services.

Senator Grassley's creeping capitalism bill would mandate this increase of formally advertised procurements by five percent a year until 70 percent of all DOD purchases were formally advertised. The Air Force opposes the bill in the belief that, if passed, it would inhibit the procurement of major weapon systems, research and development, and complex service contracts (modification and repair of weapons systems and components).

Public Law 98-369, Title VII, the Competition in Contracting Act of 1984, requires the use of competitive procedures to obtain full and open competition. In defining competitive procedures, however, the new law eliminates the preference for formal advertising (now called sealed bidding) and puts the use of competitive proposals on an equal footing with the use of sealed bidding. The mandate of the new law has been incorporated into the Federal Acquisition Regulation and contracting procedures now will recognize competitive proposals and sealed bids as equally valid methods of obtaining the benefits of competition in Government procurement.

CONCEPT DEVELOPMENT TO FULL SCALE PRODUCTION

Senator LEVIN. It has been suggested that compressing the time from concept development to full scale production will reduce weapon system costs, because there will be less time to add improvements or more expensive features to a system. Do you agree with this? Can we really save money by simply compressing the development cycle?

Mr. PYATT. Weapon system acquisition costs can be reduced by shortening the acquisition process. However, it would be unwise to move so quickly that desired modifications are prohibited. The economies realized with a streamlined process are due to reduced milestone requirements and concurrent testing. However, the savings in time and resources expended are realized at a cost of higher developmental risk. If all goes well the system will come in more cheaply; but if problems develop, then the increased costs to fix them can quickly overtake the savings achieved from a shortened process.

General RANDOLPH. Simply compressing the development cycle will not necessarily reduce weapon systems costs. The key to reducing cost is maintaining program stability. Our "Affordable Acquisition Approach (A^3) study", a major review of the program execution of 55 major programs over the last 20 years, revealed that "program instability (large unplanned changes in program funding and/or schedule) is the major causative factor of cost and schedule growth. Specific study recommendations to improve the acquisition process were that: (1) Program alternatives be more fully explored and a well defined cost, schedule, and technical baseline be established before entering FSD; (2) approval to start FSD be recognized as a commitment to production with plans, funds, and acquisition strategy, accordingly; and (3) continued emphasis be placed on improving program management tools, ie., competition, cost estimating, program baselining, and multi-year procurement.

If the proper emphasis is placed upon these areas then the result will be shorter acquisition time and reduced cost. Our Command is currently implementing these recommendations.

PRODUCTION LINE

Senator LEVIN. It is my observation that the United States does not have the personnel resources to know whether or not a production line is optimized for costs. Do you agree with this, and if you do, should we develop such a capability?

Can such a capability be developed given civil service and compensation limitations?

Mr. PYATT. I believe the best way to foster growth of the people is to continue the pressure on contractors for quality products on a fixed price basis with contracts developed in a fair competitive environment.

It is highly unlikely that any significant capability could be generated in the government given the constraints on government employment and the relative shortage of these type people to draw from even in industry.

General RANDOLPH. AFSC is working hard to increase our effectiveness in the area of what we call "producibility," that is, the characteristics of design that enable economic fabrication, assembly, inspection, and testing using available production techniques. Our efforts are reflective of an increased awareness across the Department of Defense of this critical activity. For example, in January 1984, a new Department of Defense Directive (4245.7, "Transition from Development to Production") was published. It provided increased emphasis on the application of fundamental engineering principles and relevant technical disciplines during development and production. Our emphasis is formalized through industrial resource analyses (IRAs) and production readiness reviews (PRRs), as well as a requirement for a comprehensive producibility engineering and planning (PEP) program as a requisite for significant programs entering full scale development.

Within AFSC, we have moved to increase the role our manufacturing personnel play during systems acquisition through the implementation of formal manufacturing management methods and tools. This ensures the effective conduct of comprehensive PEP programs, and assures that contractor deficiencies identified during review are properly addressed.

To provide added emphasis to these important activities, the AFSC Commander, General Lawrence A. Skantze, has issued policy on specific actions which will ensure we pay proper attention to producibility in our systems design process. This policy changes our source selection criteria to add needed emphases and incentive contractors to focus their attention on this goal. Our field commanders are not charged to ensure design for reliability, maintainability, and producibility is ranked as the first item in the highest ranked area for source selection. This will enable the command to make source selection influenced to the maximum by these parameters, ensuring through the producibility considerations that contractor production lines are optimized.

Another method we use to ensure that contractor production lines are optimized for costs is the application of "should-cost" analysis. This analysis employees an integrated team of Government contracting, contract administration, pricing, audit, and engineering representatives on site at the contractor's plant to: (1) identify uneconomical or inefficient practices in a contractor's management and operations, (2) quantify their impact on cost in order to develop realistic price objectives for negotiation, and (3) lead to improvement in the contractor's economy and efficiency. It differs from regular cost analysis in its depth, location, and in the extent to which it identifies and challenges inefficiencies in the contractor's management and operations, rather than merely challenging proposed costs.

Should-cost analysis is manpower intensive and time-consuming. In addition, there is a "window" of maximum effectiveness which limits the more widespread use of this technique. This window is bounded by limits with respect to initial production history, competitive environment, remaining quantities to be produced, cost history, adequate time for planning conduct of the analysis, and the availability of personnel with required skills. We are proud of the excellent results which have been achieved under should-cost analysis within AFSC.

These techniques, in addition to the benefits in efficiency experienced as a result of the pressures of competition, enable AFSC to gain maximum effect from our available resources.

MULTIYEAR TERMINATION LIABILITY

Senator LEVIN. One of the impediments to multiyear procurement proposals being approved has been the requirement to fund the termination liability in the first year. Does this seem like a sound accounting practice?

Mr. PYATT. No. The service would not propose or the Congress approve a program for multiyear procurement which had any significant risk of cancellation. This requirement is a major and unnecessary impediment to the development of multiyear programs.

General RANDOLPH. This is a sound accounting practice to the extent that it is a conservative accounting practice. This currently used approach ties up moneys that will not be spent—a practice few accountants would use. Were there no requirements to fund to termination liability in the first year, it would reduce the funds necessary to accomplish a multiyear procurement; this would allow the funds to be used to support other needs. On the other hand, were such an "unfunded" program cancelled, funds may have to be obtained from other sources to cover the termina-

tion liability. In extreme cases, this could force cancellation of other programs, or the use of supplemental appropriations, with possible resultant perturbations in important Department of Defense programs.

Consideration might be given to allowing unfunded termination liability ceilings for carefully selected programs. Such programs should have demonstrated stability and a likelihood of cancellation that is extremely remote.

DUAL SOURCE PROCUREMENT

Senator LEVIN. In a dual source procurement, how do we protect against one party bidding very high, accepting the smaller part of the buy, and still making a good profit? In fact, it seems that if both parties have this strategy, the government will be much worse off than if it had a single source. What do we do to prevent this?

Mr. PYATT. We solicit, negotiate and award dual source programs in an identical manner to single source programs and usually reserve the right to award all or none of the requirements to the offerors seeking the award(s). The evaluation criteria for awards in dual source programs include price, delivery schedule and prior performance history. National defense and industrial mobilization base may also be a factor. Award is made based on the offer (or offers) most advantageous to the Navy, price and the other evaluation factors considered. However, in many systems, we do plan to maintain the second source and do have the problem of preventing excessive costs due to the strategy you outline. Fortunately, the case does not occur very frequently. Most managers like to win.

General RANDOLPH. One of the key issues facing program managers is the allocation of production quantities during the split buy, competitive phases of multiple source program. Typically, the low offeror is awarded the major portion of the annual buy, but the high offeror receives at least part of the buy. This apportionment, resulting from the desire to maintain two production sources, could diminish competitive pressures.

Splitting of production buys is accomplished to ensure future competition. By definition, this involves a short-term loss of procurement efficiency in that award of the entire instant requirement to the low offeror would cost less. On the other hand, failure to accomplish such split awards could permanently impair the capability of the initially higher-priced contractor to subsequently compete. This could result in the establishment of the initially lower-priced offeror as a sole source supplier, subjecting the Government to potential monopoly pricing over the remaining life of the program.

It is possible that contractors could overprice the lower quantities under split quantity award. The principal ways in which this potential problem is overcome are through use of technical analyses, independent Government cost estimates, and requirements for certified cost and pricing data from offerors. These techniques support the Government team during negotiations to ensure that the prices achieved are fair and reasonable for all contractors. Despite these techniques, it must be admitted that, if a minimum rate is guaranteed, some negotiating leverage could be lost. Theoretically, contractors could be content with the smaller quantity and seek instead to maximize profits at the lower quantity. To help prevent such "gaming," the Government, in its solicitation award criteria, reserves the right for 100% award to a single contractor. Such a provision helps keep contractors "in line" with fair and reasonable proposals.

Senator QUAYLE. The committee is adjourned.

[Whereupon, at 11:47 a.m., the committee was adjourned, to reconvene upon the call of the Chair.]

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